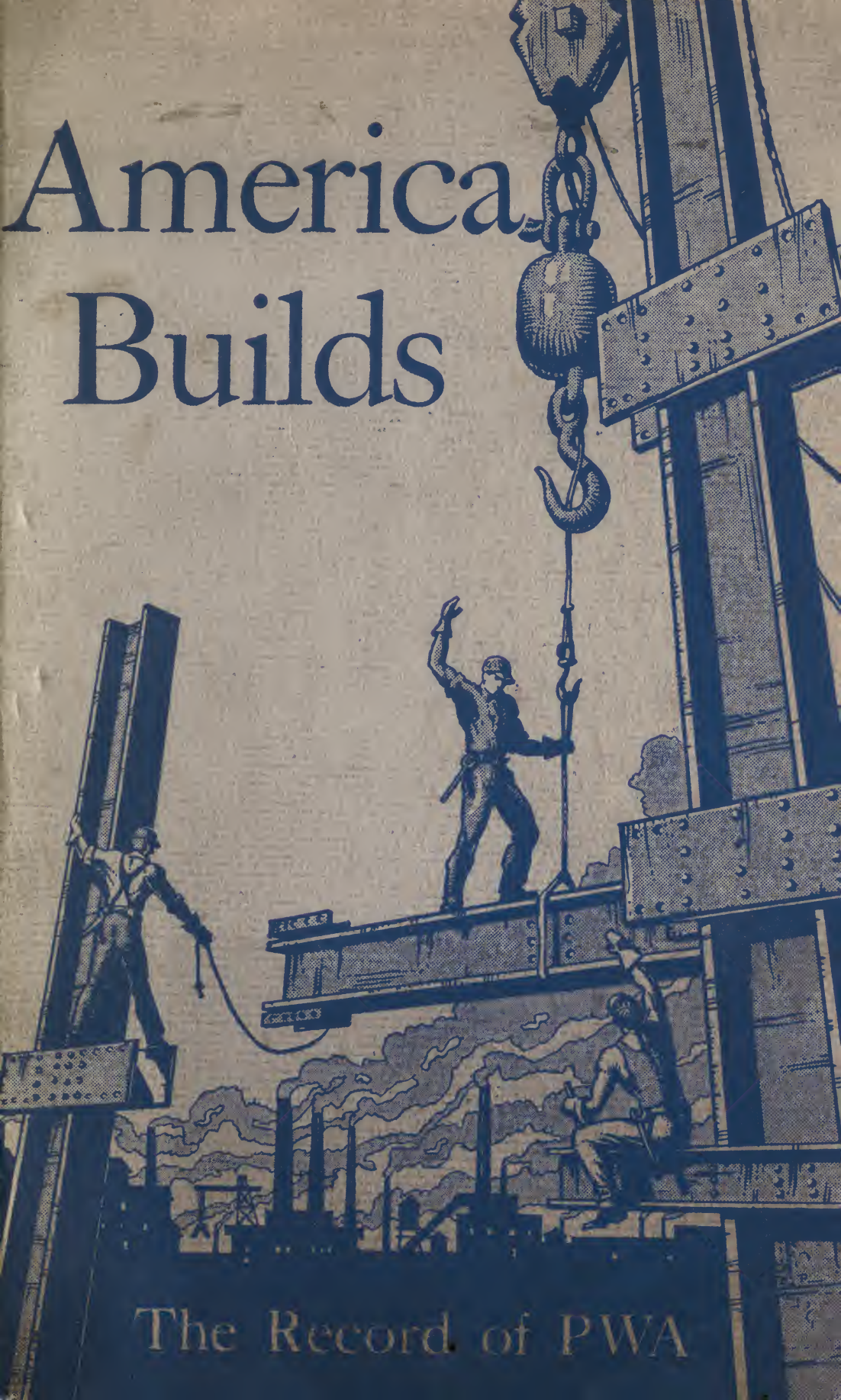


America Builds



The Record of PWA

From the collection of the

J f d
y z n k
x o Preinger Library
u v q g a h
e
b t s w p c

San Francisco, California
2006



Prefatory Note

SINCE THIS REPORT WAS PREPARED
FOR PUBLICATION, THE PUBLIC WORKS
ADMINISTRATION ON JULY 1, 1939, IN
ACCORDANCE WITH THE PRESIDENT'S
REORGANIZATION PLAN, WAS TRANS-
FERRED TO THE FEDERAL WORKS AGENCY
HEADED BY JOHN M. CARMODY,
ADMINISTRATOR

America Builds

THE RECORD OF
PWA

PUBLIC WORKS ADMINISTRATION .

PREPARED IN THE DIVISION OF INFORMATION

UNITED STATES GOVERNMENT PRINTING OFFICE · WASHINGTON · 1939

FOR SALE BY THE SUPERINTENDENT OF DOCUMENTS

PRICE 70 CENTS

A M E R I C A B U I L D S

Foreword

IN JUNE 1933, this Nation undertook to test whether public works, carried out through the normal channels of private enterprise, could be made effective as a medium of reemployment and economic recovery. The Congress entrusted stewardship of this colossal task to the President, and as his agent established the Public Works Administration, familiarly known as PWA.

For almost 6 years, with funds appropriated by the Congress at irregular intervals, PWA has carried on a Nation-wide program of construction, in cooperation with the various departments of the Federal Government, and with thousands of State, county, city, and other local governments. In

carrying out its duties, PWA has acquired a wealth of experience and has accumulated factual records and data by which an objective and definitive appraisal of its activities now may be made, and in the light of which the whole theory of public works may be reexamined.

At this time, when national recognition of this 6 years' endeavor has been accorded by the President's action in including PWA in the new Federal Works Agency, it is appropriate that a record of PWA's work be made available. Therefore, I have had this publication prepared in order to present in a single, comprehensive report, such essential information regarding the history, experience and activities of PWA as may be of interest to citizens generally as well as to students of the theory of public works and its efficacy in helping to bring about economic recovery.

Harold L. Ickes

Administrator.

WASHINGTON, *June 1, 1939.*

Contents

FOREWORD	By the Administrator	Page V
----------	----------------------	-----------

SECTION ONE

CHAPTER I	Theory and Facts	I
II	Men and Materials	17
III	Mandate of Congress	33
IV	Legal Framework	49
V	Loans and Bonds	61
VI	Engineering Blueprints	73
VII	Honest Dollars	83

SECTION TWO

VIII	The Federal Programs	95
IX	Electric Power	115
X	For Better Education	127
XI	Aids to Health	141
XII	Sewage and Stream Pollution	155
XIII	Water Is Life	169
XIV	Land, Sea and Air	181
XV	For Government Business	195
XVI	Public Housing	207
XVII	Summary	219
XVIII	Case Histories	225

APPENDIX	263
----------	-----

Project maps, type and summary tables, miscellaneous information

INDEX	293
-------	-----

Section One



A M E R I C A B U I L D S

Chapter I

Theory and Facts



ON THE 16th of June, 1933, PWA was born.

In the White House, the executive offices in the west wing were crowded. Members of Congress, Government officials, and newspaper men, alert and expectant, reflected the hope of a Nation which had undergone more than 3 years of deep depression. On the President's desk rested a mass of weighty legislation—the last bills passed by a Congress which had labored and sweated for 100 days of a history-making emergency session.

At 5 minutes before noon the press photographers lined themselves up in the President's old ¹ office. They raised

¹ The executive offices were later remodeled as PWA Federal project No. 1.

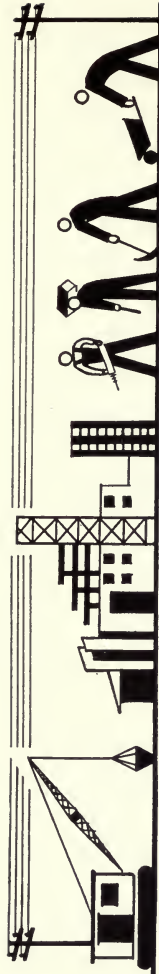
their cameras and focused their lenses on the President seated at his desk, and on the two Senators and four Representatives arrayed behind him against the windows overlooking the south lawn. Smiling and confident, the President lifted his pen. The flash-bulbs flared. The camera shutters clicked. With bold strokes, the President signed "Franklin D. Roosevelt" to the National Industrial Recovery Act, Title II of which provided for the largest program of public works construction ever entrusted to a single agency.

Thus, the Federal Emergency Administration of Public Works, soon to be popularly known as PWA, was launched on its career.

In the rain-swept streets of Washington as well as in the stately offices of the White House, in homes and business offices throughout the Nation, people knew that their Government had embarked at last on a program of action to cope with a major problem of the depression. The radio and newspaper headlines carried the story to the myriad workers who had been normally employed in the construction trades—carpenters, bricklayers, masons, plumbers, cement mixers, drillers, pipe fitters, truckmen, and steel workers. The message reached laborers in the iron, coal, lead, and copper mines, in the steel, lumber, and cement mills, in the factories making brick, tile, glass, hardware, linoleum, sheet metal, doors, bathtubs, radiators, derricks, and excavators.

Here was an army of about 6½ million skilled men who had participated from 1922 to 1930 in the largest construction boom this country had ever known. During those buoyant, optimistic 8 years, they had worked with private and public capital to build and furnish materials for an average of well over 10 billion dollars worth of structures annually. For private individuals and firms they had built apartment buildings, homes, office buildings, and factories; for public utilities they had built dams, power plants, and telephone exchanges and had laid cables, pipes, wires, and rails; and for Federal, State, and local governments they had built bridges, roads, city halls, courthouses, schools, hospitals, and administration buildings.

CONSTRUCTION ACTIVITY IN THE UNITED STATES



1921 - 1926
5 YR. AVERAGE



TOTAL \$10,571,000,000.

1926 - 1931
5 YR. AVERAGE



TOTAL \$13,275,000,000.

1933
DEPRESSION



TOTAL \$4,016,000,000.

1934 - 1939
5 YR. AVERAGE



TOTAL \$7,261,000,000.

PUBLIC WORKS

ALL OTHER CONSTRUCTION

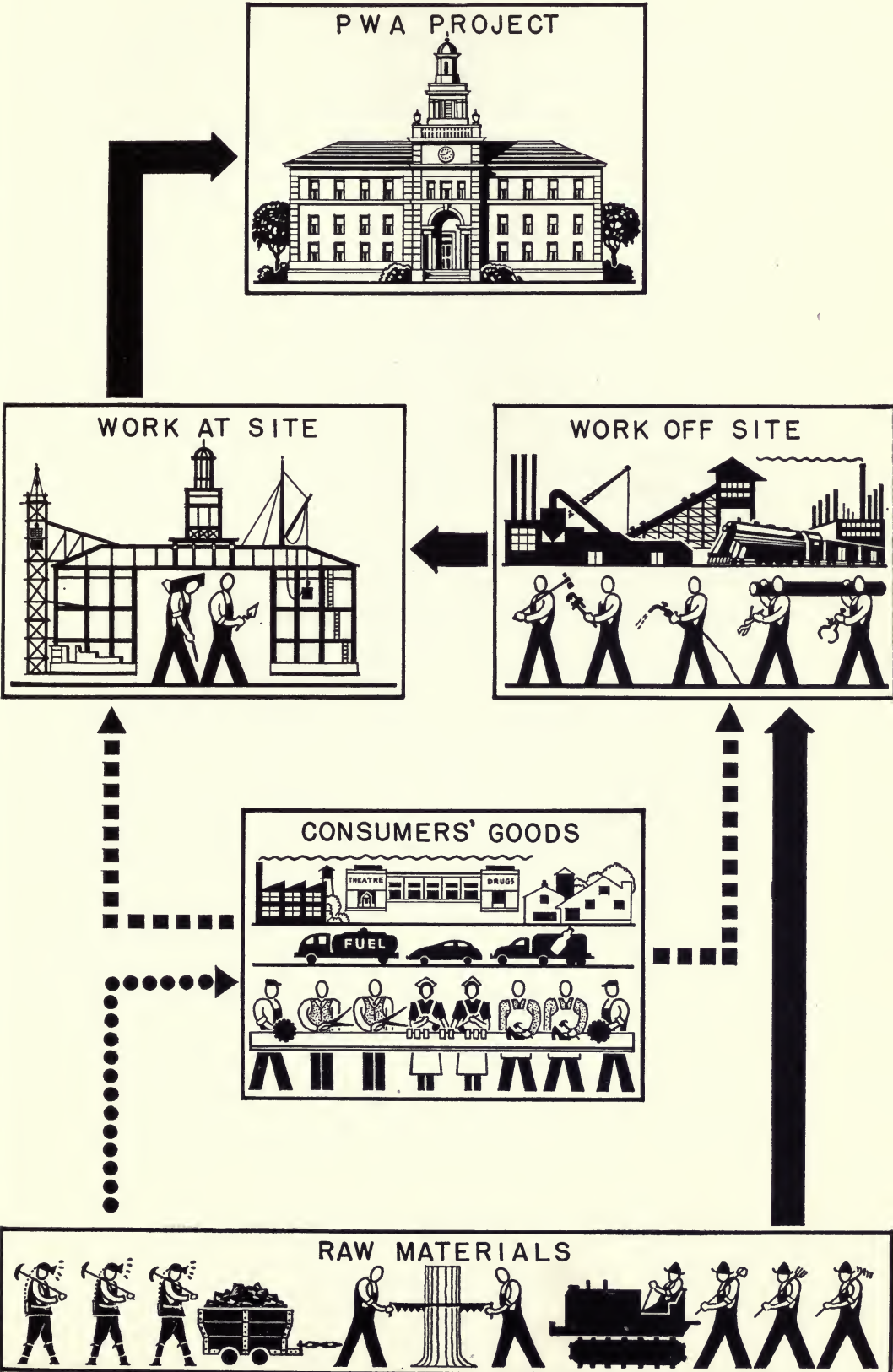
Then came a certain 16-million-share day on the stock exchange. The shattering of the ticker heralded depression. Construction slowed down. Expenditures by private individuals declined. Expenditures by public utilities dwindled. Expenditures by State and local governments staggered to a standstill. Only the Federal Government, whose normal expenditures for construction accounted for a mere fraction, less than 3 percent of the total, continued its activities. All in all, by 1933 total expenditures for construction of all types trickled down to less than a third of that of peak years.

Urgent appeals were made by high Government officials for business to continue its building activities. Special appeals were directed to the public utilities. They were of no avail. The bread lines grew longer and longer. But there is no need to dwell on this story of the anguish and despair that prevailed. The memory of man is not so short.

Voices from the dim past now began to make themselves heard—the voices of men who had long advocated expansion of public works in times of depression. These men were not gloomy Jeremiahs. They were hardheaded realists—businessmen, industrialists, practical economists, and foresighted legislators in various State assemblies and in the National Congress. They were men who knew that since earliest times public works had been used in all countries to take up the slack in unemployment.

When it finally dawned on the Nation that here was no mere fluctuation in the business cycle, that the country was really in a major depression, these ideas began to gather weight. Modern protagonists of the theory urged action by the United States. In the United States Congress, Senators Wagner, La Follette, Costigan, Cutting, and others advocated the immediate launching of a Nation-wide program of public works. Bill after bill was introduced in Congress. They were all pigeonholed, defeated, or vetoed. Finally in 1932, a compromise measure, the Emergency Relief and Construction Act, reached the desk of President Hoover and was signed.

PUBLIC WORKS GENERATE EMPLOYMENT



THE ACT OF 1932

This act provided \$329,660,000 for Federal public works and authorized the Reconstruction Finance Corporation to lend up to 1½ billion dollars for construction to States, counties and cities, and, in some instances, private corporations. But there were strings tied to this measure. The non-Federal public works had to be "self-liquidating" in character. They had to be projects that would earn an income.

While sponsors of the bill were proud of it, feeling they had made a step forward, other advocates of real public works felt the act did not go far enough. They felt that the sum of money appropriated for this program was too small a force to cope with a major depression. The quantity of Federal works authorized was small. The amount authorized for loans, even if local governments availed themselves of the full amount permitted, was negligible compared with the needs at the moment.

As it turned out, the program exerted little effect. What benefits it did create were more than offset by the deflationary policies in vogue with Federal and local governments. While public bodies on the one hand were trying to create increased employment and increased purchasing power, on the other hand, they were cutting salaries, stopping many normal activities, curtailing many services, avoiding as much borrowing as they could, and in many instances increasing property taxes and installing sales taxes. All of this aggravated rather than ameliorated the situation. Chicago was flat on its back; it was not paying its school teachers, its policemen and firemen. It stopped all building. Cincinnati could not float a bond at a decent rate of interest. Boston was facing a crisis. San Francisco had scores of baffling problems. From coast to coast, municipalities were in financial distress.

BASIC OBJECTIVES

It was not until the middle of 1933, with the advent of PWA, that the United States after years of discussion and after many false starts embarked on a program approaching

sufficient size and scope to test the theories which had long been advocated.

What were these theories? They were based on the premise that recovery could not be achieved by pep talks. Industry could not be stimulated solely by slogans of "confidence." Here was a country with a great and growing need for more schools, more highways, more bridges, more waterworks, more services of all kinds. Here was an army of men willing and able to build them. Here was industry hungry for orders for the needed materials. The idea was to bring all of them together. The job would have to be done some time, why not now?

To do the job, everyone knew, would require a lot of money. It would require the immediate outlay of a lump sum that would normally be budgeted over a period of years. It would require billions, not millions of dollars. But the alternatives were also considered: the cost of maintaining this additional army of unemployed; the cost of bankrupt factories unable to get material orders; the cost of failure to distributors and small-business men engaged in the wholesale and retail trades, suffering from the repeated shocks of decreasing purchasing power. These are economic costs. To them must be added the incalculable cost of lost technical skill, of lost morale, of lost opportunity.

The basic objective was to restore purchasing power—to bolster a sagging national income. By providing jobs and material orders through the normal channels of business a whole segment of the economic structure could be aided. Existing enterprises—contracting firms, engineering firms, architectural firms, material and supply dealers, fabricating plants and mills—could be sustained. Workers in the construction and allied trades—the third largest group of workers in the Nation ² (exceeded in size only by the farm group and the retail and wholesale trade group)—could fulfill their consumer needs. The whole economy could be stimulated.

PWA was set up to provide jobs, to stimulate business, to

² See *Construction Activity in the United States*, U. S. Department of Commerce, Govt. Printing Office, Washington 1938.

increase the national purchasing power, and to help fulfill the needs of the people for permanent and useful public services. Congress gave the PWA the powers to carry out such a program through public works, and provided the agency with an initial fund of \$3,300,000,000—the largest sum of money ever appropriated for such a purpose. Later, under succeeding acts,³ which extended the life of PWA and clarified its authority, Congress appropriated additional sums of money amounting to \$1,655,000,000⁴ and also authorized it to use some of the proceeds from the sale of bonds obtained by the Government as collateral for PWA loans. The authority granted PWA by Congress was of wide scope and the requirement that projects be “self-liquidating,” a provision contained in the 1932 act, was absent.

ACCOMPLISHMENTS

Despite the lack of precedent for a program of such magnitude, PWA plunged into its task with a determination to carry out the mandate of Congress with as much speed as prudence would allow. In the years since its establishment, PWA has financed the construction of 34,508 projects with an estimated cost of \$6,086,000,000. Public works of every type and description—from airway beacons to giant bridges and dams—have been undertaken in all but 3 of the 3,071 counties in the United States through cooperative efforts with other Federal agencies and with thousands of local governments.

From July 1933 to March 1939, PWA aided in the construction of approximately 70 percent of all the educational buildings built in the country during the same period; 65 percent of all the sewage treatment plants; 65 percent of all the courthouses, city halls, and other nonresidential public buildings; 10 percent of all the roads, streets, bridges, viaducts, subways, and other engineering structures; and 35 percent of all the hospitals and allied public-health facilities.

³ For authority and power of PWA see *Principal Acts and Executive Orders pertaining to Public Works Administration*, Government Printing Office, Washington, July 1938.

⁴ For appropriations to and obligations of PWA see table 1 in the appendix.

Various factors contributed to the ability of the program to accomplish its objectives in large part. In the first place, PWA was coordinated by the Administration with certain other recovery measures. And in the second place, PWA was established by the Congress as a Nation-wide cooperative program. The ability of PWA to assist State and local governments in meeting their requirements for public service was a vital element in executing a public-works program of wide scope. The mere expansion of Federal works, it has been shown, would never have had the same results.

BENEFITS OF PUBLIC WORKS

The public works constructed by all branches of Government has produced three salutary effects. Through wages, material orders, and other business contracts carried out through the normal processes of private business, the public-works program has created an effective demand for consumers goods and services, for so-called capital goods, and for financial credit.

1. The wages paid out of funds for PWA projects to the men employed in the construction and allied trades went for the purchase of food, clothing, shelter, entertainment, and other services and products. Billions of paralyzed dollars, which might not otherwise have gone into circulation, were traded for *consumers goods*.

2. The nature of PWA construction required considerable expenditures for so-called durable goods. Buildings, ships, dams, power plants, and other structures created a demand for pumps, heating plants, motors, tanks, elevators, and similar goods. At the same time contractors and manufacturers with part of the funds obtained from PWA contracts were placed in a position to buy capital equipment and so-called producers goods, such as dredges, tractors, excavators, bulldozers, trucks, jackhammers, compressors, and hoists. While the exact amount of such goods used on PWA projects has not yet been accurately determined, it is estimated that PWA accounted for a considerable part of the total *industrial goods* produced during the last several years.

3. In many cases where businessmen did not have to utilize funds to maintain their enterprises they actually registered profits over a period of years. PWA contracts and material orders served as valid types of security and created a demand for loans from private banks and other lending agencies. Thus PWA activities have acted as an outlet for *private credit resources*.

REGENERATIVE EFFECTS

The funds released to a public works program, the experience of PWA has shown, have a regenerative effect. PWA dollars continue to be used over and over again, creating a powerful and beneficent effect time and again, alternately to buy goods and to supply the wherewithal to pay men to produce more goods. A worker gets a PWA job. He receives his first pay envelope. He needs a suit of clothes, so he spends a part of his pay at the clothier. The clothing dealer takes part of the money and pays the jobber. The jobber takes part of the money and pays his manufacturer. The manufacturer pays his workers and buys more cloth from the mill. The mill owner, in turn, takes part of the money and buys wool and cotton, and perhaps more machinery, and so on. A large part of such expenditures represents a *net* increase in demands.

It has also been considered important that PWA projects themselves do not compete with other products of industry. They do not enter on the market for sale. Rather, the buildings, bridges, sewer systems, roads, and other public works often serve to stimulate additional purchases and further employment of labor. The PWA buildings at the San Francisco Golden Gate Exposition, for example, help to stimulate tourist trade. Later they will serve as facilities for an international airport.

The ability of a public-works program to take up some of the slack of the decline of the construction industry has been impressively demonstrated by PWA. It has established in the minds of people not only its capacity through democratic procedure to stimulate recovery, but also its possible value

as a means of stabilizing our national economy. The experience of PWA indicates that public works can be utilized with great advantage to help keep the business cycles from dipping too low or going too high. It advances the probability that various local governments can curtail public construction to a great degree in times of economic prosperity, and can reserve such works as are not essential at the moment for periods of economic depression. By timely action, public works can assist greatly in halting a deflationary movement before it has gone too far. Or it can speed up recovery when the upswing begins.

TRADITIONAL POLICY

Advocates of public works have long urged their use for such a purpose. They have deplored the traditional policy hitherto pursued by the various local governments, namely, that of expanding and contracting public works parallel with expansion and contraction of business. In the past, public works as a rule were undertaken in good times when funds to initiate projects were easily available. As a result, governments competed in boom times with private industry for labor, materials, and credit, thus raising the cost of public works.

On the other hand, when depressions came, funds and credit were scarce. The public demanded a reduction of expenditures, so new construction came to a standstill. This curtailment coincided with the stoppage of private building. It aggravated the situation by adding to the problem of unemployment, idle goods, and unused capital. The governments, in that way, acted so as to deflate not only themselves but the economic communities dependent on them.

For years outstanding statesmen ⁵ had argued for a reversal of this policy. As early as 1919 a bill was introduced in Congress for the advance planning and control of public works. In 1921 public works planning was endorsed by the

⁵ Such as Senator Kenyon who introduced a bill in 1919 carrying an appropriation of \$100,000,000, to create a U. S. Emergency Public Works Board.

President's conference on unemployment. Two years later, Secretary of Commerce Hoover requested in a letter to the President that "an Executive order be sent to all divisions of the Government to have public works slow down until after there is a relaxation in private demands for labor in construction." Finally, in 1931, Congress enacted a bill which provided that the Federal departments should prepare plans for construction projects for 6 years in advance. (See ch. VIII.) But this bill concerned only the Federal Government and left the larger portion of the public-works field unprovided for.

PWA has shown how a public works program can be an effective Nation-wide program, which could operate like a peacetime army with a standing force under arms in the manner of an organized National Guard available for prompt action and with plans ready for larger mobilization. Even if it never became necessary to issue "marching orders" the Nation would still be in a position of economic preparedness. With the National Government in a position to determine through Congress when a Nation-wide program should be undertaken, it could obtain the cooperation of local governments to reserve a share of their public works for future periods of emergency.

ADVANCE PLANNING

The use of public works as an instrument for economic stabilization, however, presupposes their advance planning. All construction in a sense involves some planning. The man who builds a bookcase for his library plans his job so as to produce it when he has the time and with an eye to the appearance and usefulness of the finished product. The architect building a home or the engineer responsible for a bridge also plans his work. Public works officials in towns, cities, and States are always drawing up plans for projects. But a collection of projects, worthy and well-designed in themselves, does not make for full and proper planning. One must consider public works in relation to the necessity for them, and to their timeliness, particularly in connection

with other improvements which are contemplated. If Anytown, for example, is limited by its finances as to the number of projects it can build, then it must consider what is needed most. Should it extend its sewer system first or build a new hospital first? If it is laying out a new industrial area, should it lay out its streets or build its water system first? Or should it wait until it can build several works at once so as to make full use of the new area?

Planning frequently involves the relationship of a given improvement to similar needs in a whole area. If, for example, Anytown wants to build a sewage disposal system to abate pollution in the stream that runs through its residential area, should it not attempt to coordinate its projects with those of other towns on the shores of the same stream? Planning also involves a choice between building a project of a size that would serve the present population or of a size that would take into account future needs. These are some of the aspects of planning which all Government officials must keep in mind. They are interrelated with municipal fiscal policy, and involve the long-range view, inasmuch as the financing of permanent improvements is a matter which nearly always extends over a long period of years.

BASIS OF ACTION

Today there are more than 1,500 towns, cities, and counties with planning commissions trying to develop comprehensive plans for the future of their communities and seeking to coordinate action to carry out their plans. The idea is rapidly spreading not only upon a local basis but also upon a State, regional, inter-State and even national basis. Such planning makes it possible to lay out a program of permanent improvements not on a year-to-year basis as has been the common practice in the past, but over a long period of years. Such an accumulation of projects can be utilized to build up a reservoir to be maintained during eras of prosperity, to be released at the proper time during periods of economic depression.

How a reservoir of projects permits action to be undertaken

with promptness was demonstrated by the Public Works Administration in 1938. With a "backlog" of applications on file, and with requests from municipalities for projects coming in at the rate of a billion dollars a month within a 3-month period, PWA found that when it became necessary to expand public works activities at a given time, it was able to proceed with a minimum of delay. In many cases communities had already secured authorization for their bond issues, had drawn up detailed plans and specifications, and had acquired sites so that within 2 weeks' time after the word "go" was given, the dirt began to fly, and a vast Nation-wide program was under way.

While PWA has shown that it has been able to create a remarkable expansion of public works in a time of depression, the task of creating a public works policy so flexible that communities would also be able and willing to contract its construction in boom periods and set up reservoirs of projects for emergency use is just now being tackled. PWA has of necessity had to contend with an emergency situation, but during its lifetime it has acquired a vast fund of information concerning public works of all sorts, Federal, State, and municipal, throughout the country, and has set up a smoothly functioning machinery containing expert personnel thoroughly familiar with the problems involved.



WORKERS AT GRAND COULEE DAM ON THE COLUMBIA RIVER IN WASHINGTON STATE LINE UP AT THE PAY WINDOWS TO RECEIVE THEIR WAGES. SOME HAVE HAD STEADY WORK ON THIS GIGANTIC PROJECT FOR THE PAST 5 YEARS

A M E R I C A B U I L D S

Chapter II.

Men and Materials



EVERY person wants to know what he is going to get for his money. A prudent investor also likes to examine carefully what he has bought so that he may determine whether his investment has been a good one, and whether, when the occasion arises, he would invest again in the same way. PWA, as a prudent investor, has made a technical examination of every local project proposed before it has allotted funds, and has maintained a check on the public works built with its funds. Every inventory it has taken shows that PWA projects, on the whole, have been well built and honestly built, and that the schools, hospitals, court-houses, bridges, roads, waterworks and other public works of

a permanent nature have met definite community needs.

But PWA was established as a recovery agency, and has therefore been interested in more than the end products of its investment. It has been interested in determining how much employment the building of these projects has created, how much employment it has provided at the sites of construction and in mills, plants, and factories supplying materials for the projects; how much stimulus it has provided for industry; how much business it has generated throughout our whole economy.

Such facts have not been easy to determine. If PWA dollars could have been marked with a distinctive symbol, their progress and speed from the mint to the Treasury, from the Treasury to the local owners of public works, from the sponsors to the contractors, from the contractors to the workers and to the material manufacturers, and so on down the line, might have been easy to observe. Such, however, was not the case. Workers in factories making materials had no way of knowing that their wages were paid in PWA dollars. Brakemen and handlers on railroad lines shipping materials had no way of knowing that their wages were paid in PWA dollars. There was no simple way of determining what was happening to PWA dollars.

YARDSTICK FOR INVESTMENT

PWA, therefore, turned to the Bureau of Labor Statistics of the Department of Labor, an agency with a long-established reputation for recording the facts with regard to construction and employment, to make a study of the situation. A substantial part of that study has been completed. PWA can now tell for any one project or for any number of projects the number of man-hours of employment and the amount of wages provided directly at the site and indirectly in industries supplying materials, and other important data. And these figures can be used as a guide to future investment.

The study of the Bureau of Labor Statistics was based on records showing the disbursement of PWA dollars. Each of these dollars that was used for a non-Federal project was made up of 45 cents from the Federal Treasury, and 55 cents

which came from the local government.¹ In the actual building operations, the private contractors who performed the work were the first to share in the disbursement of these dollars. The contractors submitted a certified copy of their pay rolls to the local sponsor, who in turn submitted it to the PWA engineer on the job. This statement showed the number of men employed on the construction site, how long each worked and how much each was paid. The contractors also submitted material orders, showing how much materials had been used, where they came from, and how much they cost.

So the record began with the second shovelful of earth turned on each project (usually some local official turned the first shovelful gratis). This showed the visible employment—the jobs given to the bricklayers, day laborers, riggers, stone masons, carpenters, plumbers, cement finishers, truck drivers and all the technical, skilled, and unskilled men which a public-works program calls into action.

To obtain the complete record of this one phase of employment, the contractors' pay roll forms for each of the thousands of PWA projects throughout the country were passed along and were neatly stacked in the Department of Labor. Each sheet was fed into the receiving end of a huge electric calculating machine to be ejected as a small, punched card, looking something like a well-worn meal ticket, which in a way it was, for it had recorded the meals of millions of American citizens throughout the Nation.

These cards were then fed one by one into another machine, and out of the far end of that machine came the constantly rising total of man-hours of employment on each site and the total sum spent there.

As of March 1, 1939, that figure had reached the grand total of

1,714,797,910 man-hours

of work at the sites and represented in wages a total of

\$1,206,451,900

paid at the construction sites.

¹In the first PWA program (NIRA) the ratio was 30 percent of the cost of labor and materials, and 70 percent loan.

While these are sizable figures, they represent, respectively, only about one-quarter of the total employment created by the public-works program, and about one-third of the total PWA-recovery dollars. Out of the average dollar which goes for labor and materials, 35.8 cents went for labor at the site, while 64.2 cents went for materials. Of course, this ratio varied with the type of construction. In the case of naval construction, for example, as much as 48 percent went for labor at the site, while in the case of railroad shop work, as little as 25 percent went directly to labor at the site. These men received the regular wages prevailing in private industry for the kind of work they were doing. Their wages varied from an average of 50 cents an hour on public-road jobs to an average of 87 cents an hour on building-construction jobs.

The dollars placed in the pay envelopes of the carpenters, plumbers, riveters, and other members of 307 different skilled trades, as well as in those of the many classes of unskilled workers, were used to buy goods and services. They started to generate demands which multiplied the real recovery effected by PWA.

DISTRIBUTION OF DOLLARS

The Bureau of Labor Statistics traced these dollars, undistinguished by marks from millions of others, beyond the pocket of the army of laborers working for contractors on PWA construction sites. The Bureau estimated that, for the Nation as a whole, the average PWA wage dollar is distributed approximately as follows:

- 32 cents goes to the local grocers for food.
- 16 cents goes to the landlord for rent.
- 12 cents goes for household operation.
- 11 cents goes to buy clothing.
- 9 cents goes for transportation.
- 4 cents goes for medical care.
- 4 cents goes for furniture and other equipment.
- 5 cents goes for amusements.
- 7 cents goes for other expenses (gifts, taxes, savings, education, reading, etc.).

PAY ROLL AND MATERIAL ORDERS

TYPE OF PROJECT



BUILDINGS



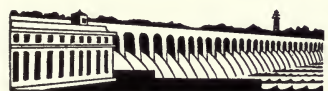
WATER AND SEWAGE



ROADS AND STREETS



R.R. CONSTRUCTION



RECLAMATION



RIVER, HARBOR WORK



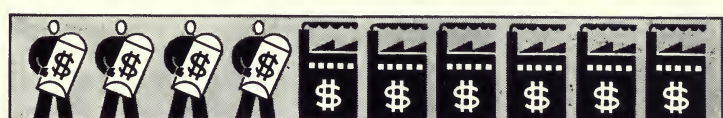
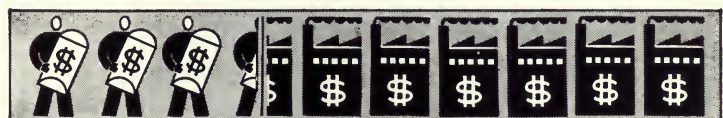
FORESTRY



NAVAL VESSELS

WAGES AT SITE

MATERIAL ORDERS



• EACH SYMBOL REPRESENTS 10% OF TOTAL SPENT FOR WAGES AND MATERIALS AT THE SITE OF CONSTRUCTION

Of course, this money circulates around the town, and helps the grocer pay his clerks, who pay their doctors' bills, who pay the garage men, and so on and on. This transfer of money is labeled "business." When the transfer is fairly rapid, business is good, and there is recovery. And when a PWA project is being built, a lot of new pay envelopes are filled, and then emptied into the community, and that speeds up business.

In studying the distribution of PWA wages for consumers' goods, the Bureau of Labor Statistics based its estimates on data obtained from a long series of studies on the cost of living in various American cities. The Bureau found that the distribution of consumer income varied in different sections of the country, and to a lesser degree between different cities within a given region.

Topeka, the capital city of Kansas, is one of the cities which has participated in the public works program. The board of education, for example, cooperated with PWA in constructing several school projects, among which was the new East Side Junior High School. This school is a two-story, fire-proof, brick structure with a decorative tower, and contains a library, clinic, shops and auditorium and gymnasium as well as classrooms. The construction cost of the building (excluding land and other items not part of actual building costs) amounted to \$310,000. The workmen and clerical and supervisory personnel at the site of the project received in wages \$86,735. On the basis of the Bureau's studies of workers' expenditures, the Bureau estimated that the workmen spent their PWA dollars approximately as follows:

They spent \$30,800 for food.

They spent \$11,275 for rent.

They spent \$11,540 for household operation.

They spent \$8,500 for clothing.

They spent \$7,025 for transportation.

They spent \$4,080 for medical care.

They spent \$2,775 for household equipment.

They spent \$1,990 for amusements.

They used \$8,750 for other expenses, gifts, education, insurance, taxes, and savings.

The creation of pay rolls, because of this direct employment, had obvious secondary benefits. Workers previously without jobs used their pay checks to purchase many items long denied their families—new clothing, new furniture and household equipment, and dental care. Buying power was put into motion.

All such purchases, wherever made, have a direct effect on merchants. If their business improves measurably, their shelves are cleared of old stocks, new goods can be ordered, and additional help may be employed. Some of these purchases would have been made anyhow, for if these workers were unemployed they would still receive from relief funds or other sources enough to buy the bare necessities. But the workers on PWA projects buy beyond subsistence needs, and in that way create a substantial increase in purchasing power. This greater purchasing power reflects itself in increased employment in the retail and wholesale trades, the home-building field, and in industries making automobiles, radios, furniture, refrigerators, and other quasi-durable goods, as well as those producing so-called consumers' goods.

Up to this point, only one-third of the PWA-recovery dollar has been accounted for. The Bureau also studied the effects of the other two-thirds. The East Side Junior High School in Topeka may again serve to illustrate the findings which the Bureau made.

MONEY FOR MATERIALS

The cost of materials for the school amounted to a little more than \$170,000, or about two-thirds of the total bill for labor and materials. This ratio was the same as that which was found to be true for all nonresidential building construction throughout the Nation. The money went for a great variety of materials—brick and tile, lumber and millwork, iron and steel products, cement and concrete products, heating and ventilating materials, plumbing materials and electrical goods, sand and gravel and the like.

The record showed that approximately \$70,000, or about

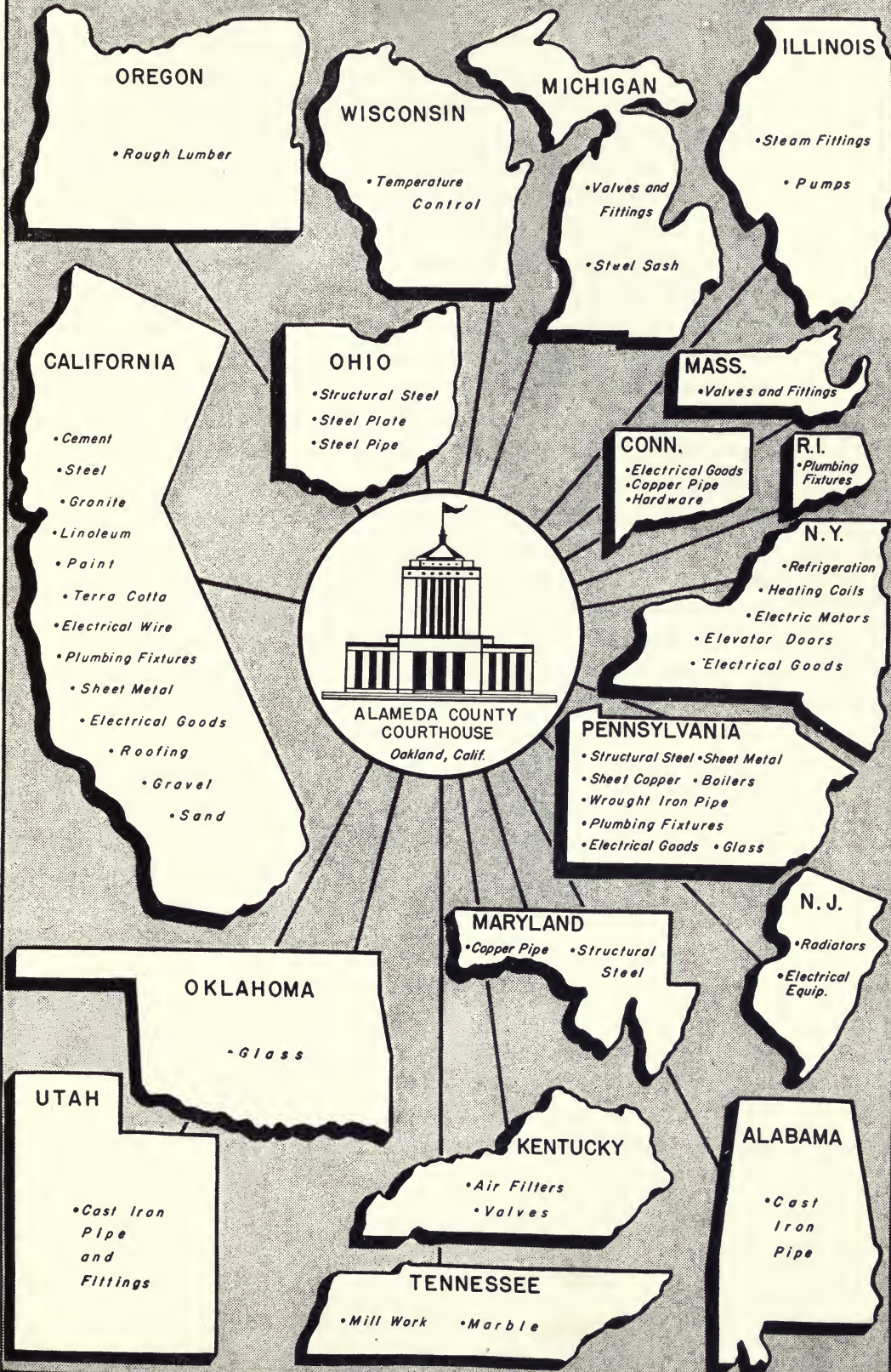
one-fourth of the total construction cost, was spent on materials right in Topeka. One bill, for example, was for \$5,809 worth of sand and gravel purchased from a nearby producer. Out of this, the firm that received the order was able to use a portion toward meeting the cost of maintaining his plant, making repairs, and paying salesmen, insurance and taxes; and to pay the wages of its workers and the men who trucked the materials to the site. Another bill, amounting to \$26,283, was for bricks and other clay products, and this order also went to a nearby producer, where more men were employed. Other material orders, necessary to supply a substantial share of the supplies needed at the site, also went to local or nearby dealers and producers.

The result of all these local orders was to increase the purchasing power in Topeka by many additional thousands of dollars. The profits made by the material supply dealers and producers, and the wages paid their employees for producing and shipping the goods, found their way in large part to the cash registers and tills of local merchants, and provided the community with an increase in business volume that might not have been achieved otherwise.

WIDESPREAD EFFECTS

But Topeka, like all other cities, does not produce everything it needs. Other supplies for construction of the school had to come from other industrial areas, sometimes from considerable distances. There were, for example, such items as \$11,341 worth of electrical goods that may have come from Pittsburgh or Schenectady. And in order to produce these products, the manufacturers in Pittsburgh or Schenectady may have had to obtain copper from the Far West, and insulating cotton from the deep South, and steel tubing from the Midwest. Consequently, a share of the PWA dollar found its way to each of these regions, where the producers in like manner used the money to pay for raw materials, to pay the wages of workers, to pay for transportation, overhead, taxes, and set a portion aside for surplus or

WIDESPREAD SOURCE OF MATERIALS FOR A PWA PROJECT



profit. The net result was that the construction of a school building in Topeka, Kans., brought wages, profits, and increased business volume to communities hundreds of miles away from the site of construction.

This widespread distribution of material orders has taken place on every PWA project. The construction of Grand Coulee Dam, in the State of Washington, has thus far called for the shipment of materials from 46 of the 48 States of the Union. The construction of the Alameda County Courthouse in Oakland, Calif., required materials that were manufactured in 18 States, ranging from the home State to as far east as Massachusetts and Rhode Island. To realize the full effect of the distribution of PWA dollars, one must add together the material orders for nearly 34,500 projects.

To determine the total amount of supplies, the Bureau of Labor Statistics turned to the records of material orders which showed how much of each type of material was used, from whom the materials were purchased, and how much they cost. These records were made into punchcards, similar to the ones made for direct employment and wages, and these cards were duly fed to the huge calculating machines. Year after year, these machines hummed on, and on March 1, 1939, the machines showed that PWA projects had called for a total of

\$2,174,833,431 worth of materials

proving that the public works program had turned out to be the Nation's best customer for almost all types of heavy industry. Iron and steel products, machinery, and cement and concrete products led the list of materials specified for the projects. (A complete list of the major types of materials purchased may be found in table 2, in the appendix.)

AIDS TO INDUSTRY

In the early years of the public works program, when the Nation was just beginning to recover from the depression slump, PWA material orders were equivalent to as much as three-fourths of the total output in some industries. In 1934,

for example, PWA orders amounted to a ratio of 74 percent of the entire output of cement for that year, almost 40 percent of the total output of fabricated structural and reinforcing steel, 35 percent of the total production of cast-iron pipe and fittings, and 38 percent of the total commercial production of sand and gravel. As recovery continued, these percentages generally declined, but for 1938, the ratio of PWA orders for structural and reinforcing steel alone amounted to almost one-fifth of the industrial production, and while recovery took place in many industries, a general survey indicates that the sharpest increases took place in the lines of business supplying public works projects.

Materials purchased for PWA construction projects

Ratio of orders to total production 1934-37 ¹

Type of material	1934	1935	1936	1937 ²
Brick and hollow tile.....	23.5	26.9	42.7	27.7
Cement.....	73.6	36.8	16.8	13.2
Structural and reinforcing steel.....	39.8	35.9	23.8	12.3
Cast-iron pipe and fittings.....	35.0	30.0	31.8	17.7
Sand and gravel.....	37.7	26.6	16.6	9.9

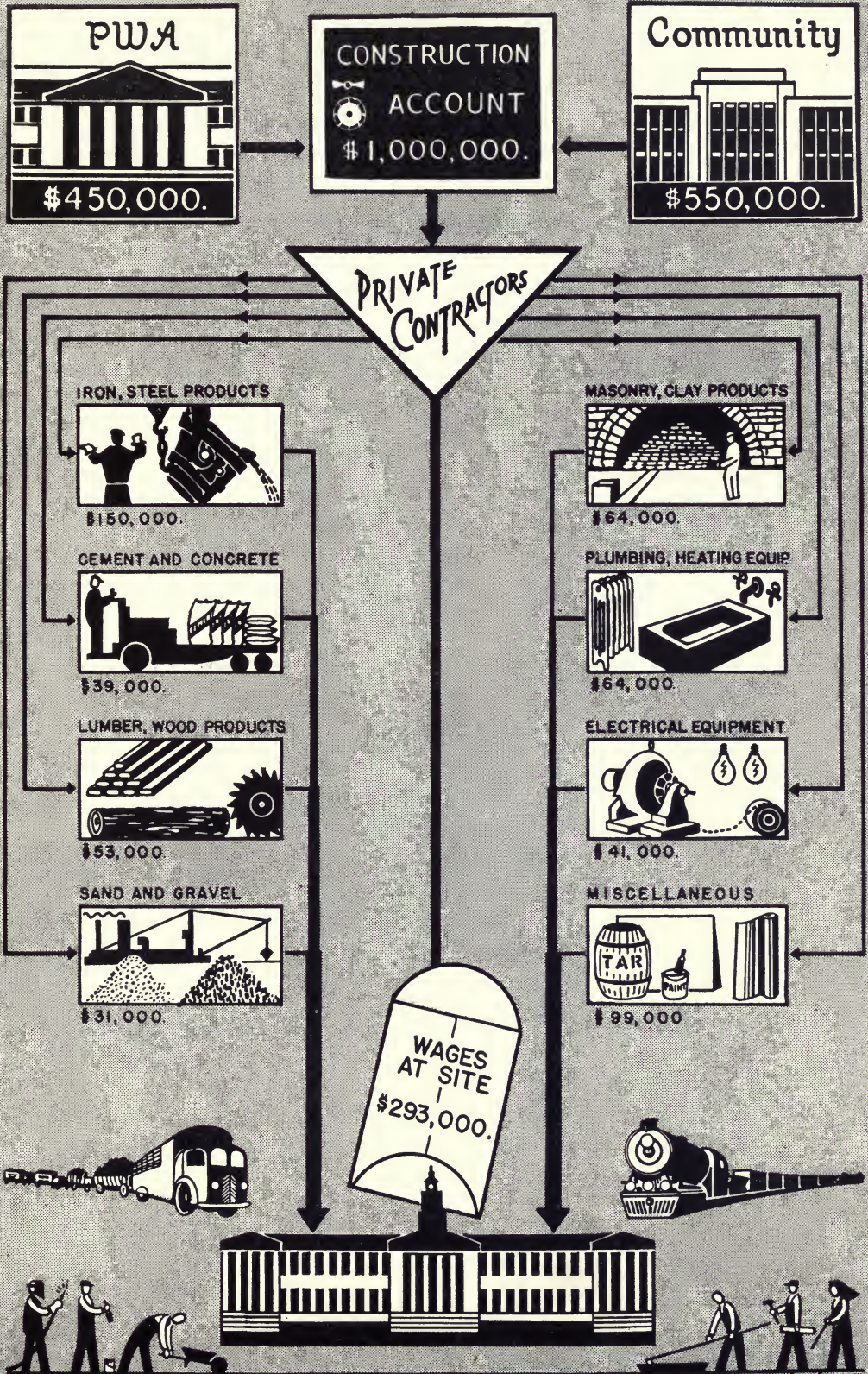
Estimates for cast-iron pipe and for structural and reinforcing steel from data supplied by National Resources Committee; all others from Bureau of Labor Statistics.

¹ PWA orders include certain distribution costs.

² PWA expenditures curtailed.

After the Bureau had obtained the total value of materials purchased, several questions arose. How many man-hours of work did it require to produce these materials? In other words, what was the total of such indirect employment created by PWA? And so, to obtain the answer, the Bureau looked down the long lists of material orders on hand, and for the selected industries made comprehensive studies of the man-hours required to produce and distribute units of these materials. In order successfully to complete these studies, the Bureau sent representatives to the manufacturers in these industries and from their records determined how many man-hours of work were required to produce a given amount of structural steel, cement, lumber, brick, plumbing supplies,

• SPREAD OF CONSTRUCTION DOLLARS



previously obtained, the Bureau determined that, as of March 1, 1939, PWA had provided a total of 4,894,000,000 man-hours of primary employment. For this figure to have any value to the Government for future planning, it was necessary, however, to determine not only the total, but to obtain a yardstick which would measure the amount of employment for every different major type of construction. It was found that each million dollars of expenditures should create the following number of man-hours of employment:

Type of project	Direct	Indirect	Total man-hours
Streets and roads.....	475, 000	668, 700	1, 143, 700
Water supply.....	262, 000	875, 900	1, 137, 900
Naval vessels.....	491, 000	589, 000	1, 080, 000
Reclamation.....	402, 000	644, 800	1, 046, 800
Residential building.....	410, 000	615, 000	1, 025, 000
Sewage disposal.....	358, 000	666, 500	1, 024, 500
Nonresidential building.....	344, 000	657, 000	1, 001, 000
Diesel power and light.....	161, 000	641, 000	802, 000
Steam power and light.....	161, 000	620, 100	781, 100

This study also showed the amount of material each industry could be expected to furnish for every million dollars' worth of contracts awarded for various types of construction (see table 3 in the appendix), and the number of man-hours of employment each industry would provide in producing materials for every type of construction. For example, in the case of a nonresidential building costing \$1,000,000 to erect, 1,001,000 man-hours of employment would be created, of which 657,000 would be indirect. The latter figure would be made up of the following: 202,700 in the industries fabricating iron and steel products; 51,900 in the lumber mills and camps; 37,800 in the brickyards; 31,000 in the sand and gravel pits; 28,800 in the plants making heating and ventilating supplies; 27,000 in the factories making electrical equipment; 25,700 in the cement mills; 21,900 in the plumbing supply factories; and 230,200 in other industries for fabrication, transportation, and administration.

THROUGH PRIVATE ENTERPRISE

All of these men, who have been given work as a result of PWA contract awards, have worked, not for the Government, but for private enterprise at prevailing wages and under working conditions common to American workmen.

In making these studies for PWA, the Bureau of Labor Statistics also learned that a substantial portion of the funds invested in public works has resulted in profits to private enterprise and in an inestimable number of instances has contributed to the ability of individual firms to remain in business. When this factor is also taken into consideration, it is obvious that the public works program has increased the volume of business and the national income by a substantial amount.

There are other factors which are essential to an understanding of the full effect of the public works program. How much work was generated as a result of wages earned by men working directly or indirectly for PWA projects? How much work was generated as a result of expenditures of pay rolls created by the purchase of durable goods, such as steam shovels, lathes, ventilation motors, and machines ordered by contractors and manufacturers who filled PWA orders? As yet, there is no complete measure for this type of employment. Perhaps, further studies will provide the answers to these questions also.

But the surveys so far completed have yielded a practical yardstick for the future. Six years ago, facing a crisis in the national economy, PWA had to start without any definite knowledge as to what its investments in public works would mean in terms of employment, wages, and material orders for industry. Today, however, the Government can estimate with accuracy the returns it may expect from expenditures for all kinds of public works. And in the future, it can utilize this knowledge to aim directly at its objectives.

A M E R I C A B U I L D S

Chapter III

Mandate of Congress



IT IS no simple task to build 34,500 public works across 3 million square miles of America, to provide millions of man-hours of work in private industry in depression times. The building up of the greatest construction agency of modern times is a story of pioneering noteworthy in itself. It is the story of transforming a 6,000-word law of Congress into an organization that has affected 130 million Americans in their daily lives.

Tried and tested by 6 years of service, the PWA organization is made up of a group of seasoned technical experts plus a force of stenographers and clerks at work in every section of the country and in the Islands and Territories.

But this organization did not arise phoenixlike from the ashes of a depression. Starting with 39 men, serving without pay, in the black days of 1933, it has been built up gradually and painstakingly over a period of years.

PWA started as several pages of paper unemotionally labeled Title II of H. R. 5755.¹

That act of Congress said: *To effectuate public works and construction projects the President is authorized to create a Federal Emergency Administration of Public Works all powers of which are to be exercised by an administrator.*

Not long after signing that bill the President called in Secretary of the Interior Harold L. Ickes, and appointed him Administrator of Public Works.

It was as simple as that. One man said to another, "You are to be Public Works Administrator." With the appointment went the responsibility of overseeing the honest and efficient expenditure of billions of dollars to help bring about recovery.

There was no time then to reflect on the magnitude of the task. It called for action and immediate action. It called for courage as well as caution.

Congress had laid down the broad outlines in the law. That is all it could do. That is all the Constitutional Convention could do back in 1787, when it wrote the Constitution and left to early Executives and Congress the task of creating a government and making it work.

ORGANIZATION

The first job was to collect a staff. It required executives who could think clearly and act quickly—and who would be right. It required men who would be willing to work long hours for the low wages which the Government could pay, and stand the abuse that is often heaped on the heads of those who hold public office.

Some of the ablest technical men in the country volunteered. They were men on whose judgment the Administra-

¹Title I of the act provided for the establishment of the NRA. For complete powers of PWA see *Principal Acts and Executive Orders Pertaining to the Public Works Administration*, Government Printing Office, Washington, July 1938.

tor could depend. They made up the board of strategy to guide the course of battle against the depression.

They brought other men with them—engineers who had built world-famous bridges, lawyers who had guided the destinies of great corporations, young men who wanted to devote themselves to Government service, and old hands at finance, who saw an opportunity to contribute to the welfare of the Nation.

There was plenty of work. There were a thousand questions to be answered, and a hundred possible answers to each question, but there was no time for fine philosophical discussion. The problems of the moment called for practical and speedy solution. Millions of unemployed people were tired of waiting for “prosperity to come around the corner.” They wanted jobs. They wanted jobs in private industry.

The law outlined the first task with the statement that, *The Administrator * * * shall prepare a comprehensive program of public works.* The law went on to describe public works as the construction and repair of public highways and parkways, and public buildings; the conservation and development of natural resources including the control, utilization, and purification of waters; prevention of soil or coastal erosion; development of water power; transmission of electrical energy; and construction of river and harbor improvements and flood control; and also the construction of any river or drainage improvement; construction, reconstruction, alteration, or repair under public regulation or control of low-cost housing and slum-clearance projects. And just to make sure, Congress added, *Any projects of the character heretofore constructed or carried on either directly by public authority or with public aid to serve the interests of the general public.*

CRITERIA ESTABLISHED

The Administrator and his staff went to work. In a short time they established the criteria that PWA was to follow, without deviation, up to the present.

These were the yardsticks by which an application of the local community was measured:

1. The social desirability of the project and its relation to coordinated planning.
2. Its economic desirability; that is, its relation to unemployment and the revival of industry.
3. The soundness of the project from engineering and technical stand-points.
4. The financial ability of the applicant to complete the work and "reasonably secure" any loans by the United States.
5. The legal collectibility of the securities to be purchased or the enforceability of any lease entered into.

The nucleus of men started to sort out the available projects according to this formula. In each State a board of outstanding persons was drafted to advise on local projects to be presented. But municipalities were unprepared. The expected rush of sound applications failed to materialize. Projects were just being thought of. But thoughts were not enough at the moment. Construction had to be started; men had to be put to work.

The Federal Government, however, was ready. The Federal Employment Stabilization Board, created in 1931, had laid out a 6-year program of construction. Many projects had been planned, and the Congress had in many instances already given authorization. But no funds had been available. The act, however, took cognizance of these works. It set aside funds for use of various bureaus. For example the law stated: *For the purpose of providing for emergency construction of highways * * * to make grants * * * \$400,000,000 in accordance with the provisions of the Federal Highway Act approved November 9, 1931.* The Bureau of Public Roads of the Department of Agriculture, which had supervised road construction for 20 years, and had supplanted the chaos of independent unconnected roads with uniform highways, could put such construction into high gear at once through the highway departments of the several States.

The President, under authority *to construct, finance*

* * * *projects included in the program* ordered² that this sum specified in the law be set aside for public roads at once, and also transferred \$238,000,000 to the Navy Department "for construction of certain vessels." Later, other Federal allocations of funds were made.

THE NON-FEDERAL PROGRAM

That was the start. The real test of PWA was still ahead. The PWA law posed the problem in a few simple words: *With a view to increasing employment quickly (while reasonably securing any loans made by the United States) * * * to make grants to the States and municipalities or other public bodies for such projects, but no such grant shall be in excess of 30 percent of the cost of labor and materials.*

There had been no precedent to guide a partnership of national and local governments on such a great scale.

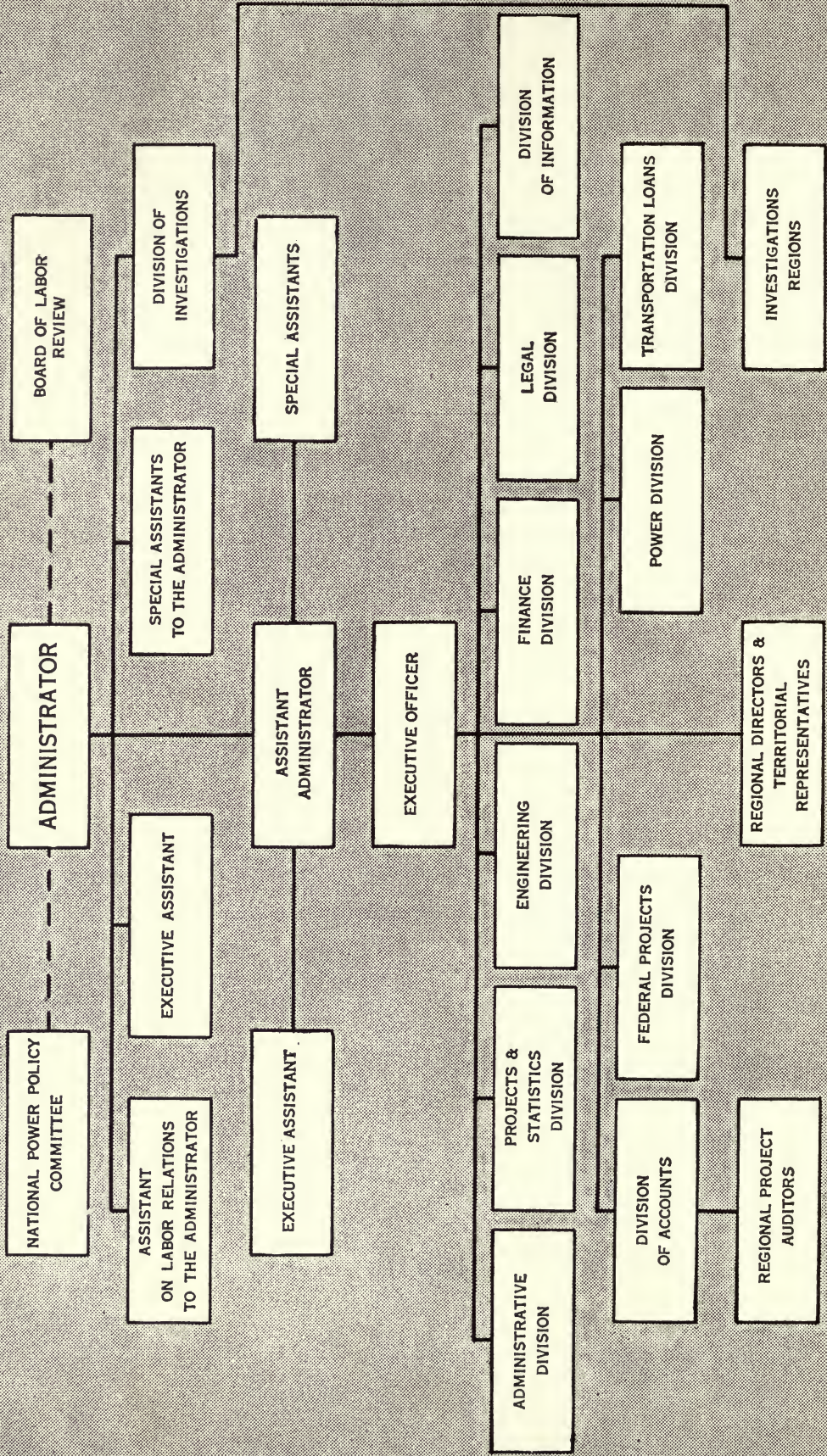
Bound by antiquated legal safeguards, most communities could not immediately undertake the necessary construction. In reply to appeals for aid from a hundred fronts, the Administrator dispatched PWA lawyers to help work out new laws, codify, speed the process up so men could go to work. Courts were asked to test the powers of these new laws, to clear the way for construction that would follow.

The collapse of municipal credit provided another stumbling block. PWA's financial experts advised, consulted, devised new methods of financing. They laid a firmer groundwork on which to build the program. In doing this, the way was paved for reforms in the cumbersome financial set-up of many of the Nation's municipalities, and they put the tremendous resources of PWA's lending power at the communities' disposal.

With legal and financial powers clarified in more and more communities, the offices of the 48 PWA State engineers were flooded with applications for aid. A school board telegraphed for a new building "so that children now attending classes in an abandoned coal bin may be decently housed." A mayor appealed for "immediate aid for a new water system

² Executive Order No. 6174, June 16, 1933.

P. W. A. ORGANIZATION



to cut appalling death rate from water-borne disease.”

Along with such requests came the demands of visionaries—plans for hiring 10,000 men to kill corporeal snakes, plans for building and operating rockets to the moon, plans for floating platforms to bridge the oceans, plans for building moving sidewalks to carry itinerant Americans at a dignified pace from coast to coast. Each project was matched against the criteria set up by the Administrator.

Even after such obviously ridiculous proposals were weeded out, funds were not available for all applicants. Allotments were made on the basis of the social desirability of the undertaking, of the employment need of the community, and according to population.

The President and the Administrator passed final judgment on the reports of their technical experts. Every proposal came up for discussion. Those that best suited the needs, those that contributed most to the Nation’s hard-hit economy were chosen. Allotments were made.³ Contracts were drawn up. PWA was ready to put the Nation to work.

A POLICY FOR LABOR

A fair labor policy was immediately needed. The law laid down the basis, saying, *All contracts let for construction projects shall * * * contain provisions * * * so far as practicable * * * no individual shall work more than 30 hours in any 1 week, and all employees shall be paid just and reasonable wages * * * sufficient to provide * * * living in decency and comfort * * **

PWA amplified this, establishing the following policies:

1. Opportunities for employment shall be equitably distributed among the qualified workers who are unemployed, not among those who merely wish to change one good job for another.
2. Opportunities shall be distributed geographically as widely and as equitably as possible.

³ Because municipalities were unprepared to put men to work immediately an allotment of \$400,000,000 was made to the Civil Works Administration to tide the unemployed over the severe winter of 1933-34.

3. Qualified workers who, under the law are entitled to preference, shall be given such preference.
4. The wastefulness and personal disappointments resulting from unwarranted migration of labor in quest of work shall be avoided.
5. Local labor shall, so far as practicable, be selected from lists of qualified workers submitted by local employment agencies designated by the United States Employment Service. Organized labor shall not be required to register for work at such agencies, but may be secured in the customary way through recognized trade union locals.
6. No convict labor shall be employed.

The contracts let, men were ready to go to work. Somebody had to see that it was done properly, according to specifications, see that 100 cents value was delivered for every dollar spent, that there was no chiseling on the Nation's recovery dollars.

As the projects were built by local authorities, local inspectors were, of course, required. But the tradition of lax local inspection was intrenched in American practice. Too often local inspectors winked at substandard materials or wage "kick-backs." The practice had grown to be accepted in a number of communities.

PWA, however, had decided that steps and measures should be taken to protect the Federal Government's interest, and a resident engineer was assigned to each project. He was the direct liaison between the Federal Government and the local authorities. He was instructed to be of service to the local authorities, and to see that no halts occurred that would throw men out of work.

DECENTRALIZATION

During the early policy-forming period, PWA's staff was largely concentrated in Washington, where it could be developed under the watchful eye of the Administrator. But as more projects got under way, an increasing portion of the work could best be done in the field. When there were more experienced men available at headquarters, it was possible to decentralize the organization.

While the so-called non-Federal program was starting there were certain highly specialized tasks that had to be

performed. For example, the law authorized: *The construction, reconstruction, alteration, or repair under public regulation and control of low-cost housing and slum-clearance projects.* This was a wholly new problem in this Nation. There was no local authority capable of carrying on this work. The Administrator set up a semi-autonomous housing division to start this work.

PWA also was called on to help private industry directly by refurbishing the Nation's railroads and a clause in the act stated: * * * *to aid in the financing of such railroad maintenance and equipment* * * *. A railroad division was set up to make loans to help the hard-pressed carriers buy modern rolling stock and certain improvements.

In addition, the law specified a program for: "* * * *the development of water power, transmission of electrical energy.*" The unique problems of constructing public power projects involved so much controversy that a special power division was set up. This division struggled with the involved technical problems that attended the efforts of the Nation and its communities to build their own public utilities.

How good were the chances for graft? The economic welfare of millions of people depended on the proper use of the billions of dollars involved in this program. The Administrator was determined that public works could be carried on without the traditional graft and waste. He decided that PWA, like Caesar's wife, should be above reproach. An investigations division, responsible only to the Administrator, enforced the rigid code of PWA standards of honesty. A few malefactors behind bars evidenced that PWA was in earnest. At the cost of occasional delays, the fight for this ideal of honesty in public works was won.

MECHANICS OF EXPENDITURES

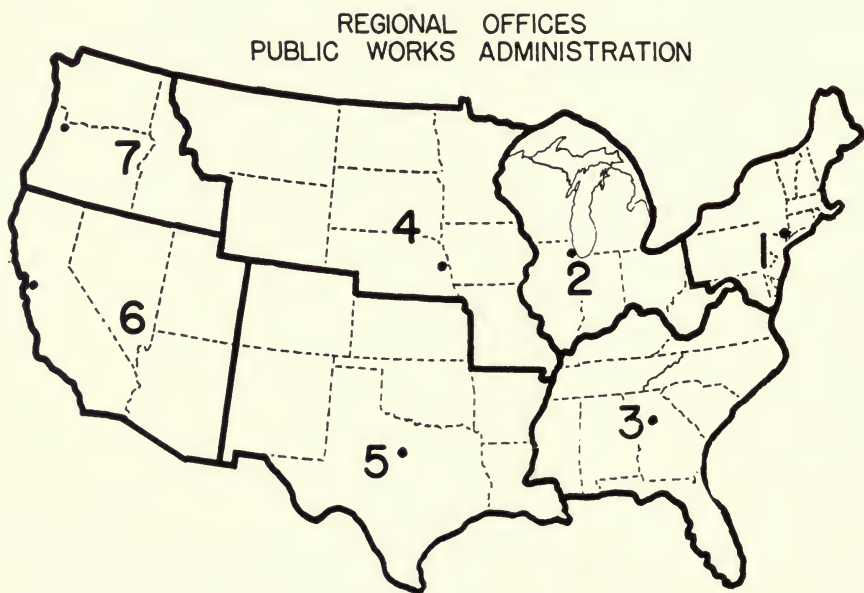
While the battle for honesty was going on, the Administrator faced a horde of critics who complained that the money was not being spent fast enough. These complaints were based on Treasury statements of PWA disbursements.

The Administrator pointed out that Treasury statements of PWA expenditures lag a long way behind actual wages paid and materials manufactured. If the critics had bothered to look into the matter, they would have found that the movement of funds generally takes place somewhat as follows:

The contractor, who is awarded the job, frequently borrows from the bank or other credit source to finance his operations. From such funds he pays his men. The community then repays the contractor—generally once a month. Later, after an auditor has checked the books and found everything in order, PWA repays the community.

Thus it may be a month or months after the worker took his pay envelope home to buy a week's groceries, before the Treasury issued a check that made that pay envelope possible. Meanwhile, money had been put into circulation and business had received its stimulus—far ahead of the time the Treasury check was cashed and the Treasury statement made public.

Of course, the organization of PWA was never static. From the time it started, it evolved, refined, expanded here and contracted there, adapting itself to changing needs.



SUCCEEDING ACTS

By 1935 the advantages of this new type of recovery agency were so apparent that Congress extended its life, sending to the President a bill *To increase employment by providing for useful projects * * * loans and grants * * * \$900,000,000*. Under this emergency Relief Appropriation Act of 1935, the amount of the outright Federal grant was increased by Executive order to 45 percent of the total cost of the project, instead of "30 percent of the cost of labor and materials" as under the first program. The increase provided for architects and engineers, the cost of necessary land, legal and administrative fees. In operation it meant better planned and better executed projects. More communities were able to participate in the recovery program.

Congress made no mention of wage rates to be paid by the contractors under this law. The President, however, issued an order that "customary local rates for all trades and occupations" be paid. This started PWA's policy of prevailing wage rates on all projects.

Congress called upon PWA again in 1936, authorizing it to use \$300,000,000 from funds already on hand or to be raised from the sale of securities purchased under previous programs. PWA approved allotments of \$179,642,771 under this act. This law was the first one to put public works on a "timetable," stating, ** * * no part * * * shall be granted for any project unless * * * completion thereof can be substantially accomplished prior to July 1, 1938*.

From the very start PWA has been thought of as a recovery agency. In an experiment to make PWA a relief agency instead of a recovery agency, some grants were made on the cost of relief labor employed plus 15 or 33½ percent, as long as the total grant did not exceed 45 percent. This did not work. In the case of the north tube of the Lincoln Tunnel in New York, for example, the criterion of being on relief did not prove the best method of selecting men for the difficult "sand hog" jobs. The same was true of other highly skilled trades.

In 1937 Congress appropriated \$144,695,914 under the PWA Extension Act, which specified July 1, 1939, as the date for completion of the projects. The act also specified that the organization which had carried on the program was to be liquidated. Personnel was drastically cut. The former State offices were regrouped into the present seven regional offices as a matter of economy. The virtual suspension of PWA recovery funds in 1937 proved to be too sudden.

As a result, Congress put the problem of reversing the downward spiral to PWA. On June 21, 1938, the President signed the law calling on PWA to supervise the expenditure of \$965,000,000. Confidence that PWA was prepared for the job was expressed in the clause: *No funds appropriated * * * for any project * * * which cannot be commenced prior to January 1, 1939, or the completion accomplished prior to June 30, 1940.* This was the greatest construction program ever undertaken in such a short time.

In liquidation when the law passed, PWA personnel was down to a nuclear basis. But that nucleus of 3,700 was able, experienced, trained down to a fine point. Without the experienced, trained personnel it would have been impossible to expand the force to a point necessary to review 20,000 applications, make 7,000 allotments, and get men to work on these projects in 187 working days.

But on December 27 the Administrator wrote: "My dear Mr. President: I am happy to report the program is on schedule. Six thousand one hundred and eighty projects are under way." PWA had met the challenge. It had done the job, and in doing so had demonstrated the value of a smooth-functioning organization.

CURRENT ORGANIZATON

Today, as then, the work of that organization starts and ends with the engineer on the construction site. He is the man on the firing line, the man who sees to it that the policies of a Nation-wide public works program are carried out, that projects are well built, and that the contractors, workmen on

the job, and the material manufacturers receive equitable pay for honest work performed.

He is linked to one of the seven ⁴ regional offices by a traveling engineer responsible for the smooth running of a score or more projects. The regional offices are complete miniature organizations of consulting engineers, lawyers, auditors, financial experts—all of these under the supervision of regional directors who coordinate the construction program over a group of States.

Behind these officers, acting as a final board of review, setting up basic policy, keeping the program on an even keel, stands the central office in Washington. Here, 15 major divisions prepare decisions for the Administrator's final action. Among these are three technical sections: First, there is a group of engineers who review the applications of local communities and the recommendations of the engineers in PWA's regional offices; second, a group of legal experts who check the powers of the community to build projects; and third, a group of financial experts who aid local authorities to raise money, and arrange loans where necessary. The reports of these technical sections are condensed and analyzed by an administrative nucleus which matches the desirability of each project against other applications, and reports to the Administrator who recommends to the President what allotments shall be made.

The Administrator's assistant on labor relations helps to determine the wage rates that the contractors' men will be paid on the job. A division of investigations, responsible only to the Administrator, checks any allegations of graft or waste. A committee certifies to the Administrator the amount of grant earned by each community for work completed under the recovery program.

There are also groups of advisers who aid the Administrator in handling special problems. There is a division which aids local authorities in constructing publicly owned utility plants and advises the Administrator on power policy. An-

⁴ New York, Atlanta, Chicago, Omaha, Fort Worth, San Francisco, Portland. See map.

other section passes on the eligibility of other Federal agencies for PWA funds, which have been set aside by Congress for the construction of Federal projects. There are several groups of specialists who aid the Administrator in settling any labor disputes which may possibly arise. A statistical division keeps check on the general progress of the program, and an information section keeps the contractors, the industries, the communities, and the public informed on all actions of PWA which affect the recovery program.

That is the organization that has carried on American democracy's answer to the economic crisis. It is the group which has carried out the Nation's first-planned public works program and has kept men at work.

The organization has made possible more than the erection of a multitude of useful and desirable structures and the creation of millions of man-hours of work, with honesty and efficiency. It has also, coincidentally, made possible notable contributions in the fields of municipal finance and law, and in the improvement of engineering and construction practices.



THE NEW ALAMEDA COUNTY COURTHOUSE AT OAKLAND, CALIF., WHICH CONTAINS COUNTY OFFICES, A LAW LIBRARY, AND THE DISTRICT ATTORNEY'S OFFICE AS WELL AS NUMEROUS COURTROOMS. THE STRUCTURE WAS COMPLETED IN 1936

A M E R I C A B U I L D S

Chapter IV

Legal Framework



THE American Nation consists of a Federal Government, 48 Sovereign States, 3,071 counties, 24,734 cities, towns, and villages, about 127,000 school districts and upward of 100,000 other duly constituted public bodies—such as sewer and water commissions, irrigation districts, bridge commissions, and similar legal entities.

Most of these thousands of government bodies are controlled by a Federal and State constitution and a variety of charters granted by the State government; and, in addition, most of them are governed by their own local laws. Each year new situations have arisen calling for new laws to deal with them. These situations are usually met, but the laws

enacted to cope with them remain in force, embodied in the statute books that grace any law office. One result of this is that the people of today still are governed by many laws eminently suited to customs and needs of the middle nineteenth century. Another result: Even Caspar Milquetoast, the epitome of civic virtue and integrity, cannot get out of bed and go to work each day without breaking a round dozen of the thousands of laws governing the citizen's daily life.

When Congress appropriated \$3,300,000,000 to aid the local governments to put men back to work, it created a new situation. The communities needed the money for the projects, the men needed the work, the Federal Government was ready to help, but the majority of the local governments found themselves in a morass of "left-over" laws that prevented them from immediate participation.

It seemed that years might pass before the municipalities could go through the stereotyped and frequently obsolete steps of the legal ballet necessary to enable many of them to cooperate in the public works program. In order to expedite action, PWA undertook to aid communities, at their request, to "find a clear legal path out of the jungle of contradictory laws."

PWA lawyers worked with local lawyers, reviewing, discussing, drafting, and suggesting. Communities needed broader legal powers to help themselves. Disheartening, time-consuming legal impediments had to be eliminated. The whole legal procedure had to be shortened. Before long, concrete proposals took form.

ENABLING LEGISLATION

Most of the Governors of the States were aware of the problems. They cooperated, and called State legislatures into special sessions. New laws were drafted and passed. Authority was granted for work to begin. In New Mexico, the legislature met in special session and enacted a new law which would enable the State to overcome existing handicaps. This act, typical of the new type of legislation, provided that,

Any municipality may issue and sell at private sale to the Federal Government, bonds for the financing of any public works projects * * *, may enter into agreements or contracts with the Federal Government, and may do any and all other things necessary or advisable in connection with any grant or loan of money by the Federal Government in connection with any public works project, * * * and may issue and sell at private sale to the Federal Government in connection with any public works project notes, temporary bonds, interim certificates, or other negotiable instruments. * * *

The statute specifically exempted PWA projects from any requirement of public elections other than as required by the State Constitution:

notwithstanding the provisions of any general, special, or local law it shall not be necessary for any governing board to submit to the people any public-works project nor shall such public-works projects be subject to vote at any election unless and to the extent submission or such election is required by the constitution of the State of New Mexico.

* * * If the governing board shall determine to submit the authorization of any public-works project or the issuance of bonds therefor, or the levying of a tax to pay such bonds, to vote at an election, whether or not required by the constitution, such governing board may provide for such vote on notice published in a newspaper circulating in the municipality and posted in at least 10 conspicuous places on any day at least 7 days prior to such election; and no other notice shall be required.

* * * The issuance of bonds * * * may be authorized by resolution which may be finally adopted on the same day at which it is introduced by a majority of all the members of the governing board; and such resolution need not be published before becoming effective.

That statute operated to shorten the time, facilitate the procedure, and remove many of the difficulties which usually attended municipal bond issues in the State of New Mexico.

In a test suit, the supreme court of New Mexico acknowledged the validity of that law. It recognized that its purpose was to enable political subdivisions of the State to avail themselves of the Federal Government's lending program in aid of industrial and economic recovery, and to suspend certain restrictions in the general law which would unduly delay or prevent the exercise of the municipalities' powers of borrowing.

This law did what was necessary, and did it very simply. It provided that duly constituted public bodies could enter into contracts with the Federal Government, and gave them the power to issue necessary bonds to finance their share of the project, and to begin work.

A score of States, alert to the necessities of those strenuous days, similarly reorganized and accelerated the creaking machinery which seemed inadequate to meet the emergency situation. New Mexico, New York, New Jersey, Colorado, Idaho, Ohio, Florida, Virginia, Delaware, and Maryland all joined in this movement. Red tape and arbitrary delays began to dissolve before the resolute attack of this new type of legislation. The problem was not to evade the laws, but to lop off antiquated and inconsequential restrictions, and this was done.

BOND PROCEDURES

But even with this new-found authority the process was slow and cumbersome in the communities. There remained literally hundreds of steps necessary to issue local bonds after the taxpayers had approved them. The ritual was often confusing, and in many cases, the inadvertent omission of a single step somewhere along the line might have made the entire procedure illegal and the bonds therefore worthless, necessitating a new start. To handle these bond cases, a special type of legal experience was required. Consequently, the lawyers for many local governments consulted PWA, and hundreds of communities, particularly the smaller ones which were not able to afford full-time lawyers especially versed in this field, appealed to PWA for legal aid.

PWA tackled the problem by devising bond procedures which were widely applicable to the different States and their public bodies. The governing body could start on page 1 of this syllabus, debate and vote on local action, report the vote, follow the outlined procedure through to the last page, and thus take every step necessary to issue valid bonds for sale. Every point had been anticipated. Legal snarls were dras-

tically cut. An energetic governing body could get through the essential legal steps in a real businesslike way.

But in some States, the lawgivers of a bygone generation legislated "too well." Instead of setting down simple, guiding statements of fundamental principles, they wrote into their constitutions highly restrictive provisions that made every detail of a bond-issue procedure a stumbling block. In the main, these solons intended not to be obstructive or arbitrary; reflecting the spirit of their times, they merely sought to protect taxpayers from outlandish extravagance. In the South particularly, they were primarily interested in preventing a recurrence of the wildcat public financing of the carpetbagger and post-Civil-War days.

While this may have had a beneficial influence on the credit of the States and their municipalities, it hampered the ability of the States to make full use of their credit. And when the contemporary public-works program was launched, these constitutional provisions challenged the utmost ingenuity of the legal profession. Because of the zeal of the Constitutional Convention of 1877, the State of Georgia, for example, enjoyed a high credit standing, but found its ability to share in the emergency public-works program severely limited.

PUBLIC AUTHORITIES

Other States were more or less hampered in the same way. Consequently, a pathway had to be pioneered to enable the Nation to go to work. PWA called the attention of the States and their municipalities to the new-born concept of the "public authority" (a special unit of government created to perform municipal services) and the modern technique of revenue-bond financing.

Buffalo, N. Y., was among the first cities to utilize the public authority to solve a complex problem. For years Buffalo has been pouring its sewage into the Niagara River, the source of the drinking water supply of the towns beyond the Falls. The State board of health ordered Buffalo to cease and desist. Buffalo found that the cost of correcting

the situation would be \$15,000,000. The State constitutional debt limitation allowed it to raise only \$6,000,000 by taxes. No one doubted that Buffalo was financially able to raise more, but the constitutional restriction admitted of no argument. Therefore, to meet the constitutional objection, it raised the funds, not by additional taxes, but by setting up an authority, similar to a business enterprise, which could charge the public for services rendered.

It was an emergency. Buffalo lawyers, the Governor's own counsel, and PWA lawyers sat down together, and drew up a bill creating the Buffalo Sewer Authority. This authority was designed as a public benefit corporation and was empowered to build a sewage system to stop pollution of the rivers. The authority was authorized "to issue bonds for any of its corporate purposes." To repay those bonds, it was empowered "to fix and collect rate rentals and other charges for service * * * in accordance with * * * agreements with holders of bonds." The bill also provided that "the bonds * * * shall not be a debt of the State of New York or of the city (of Buffalo) and neither the State nor the city shall be liable thereon, nor shall they be payable out of any funds other than those of the authority."¹ After the bonds were paid off, the property was to be turned over to the city without cost. The authority was completely separated from the city government—controlled by commissioners who served without pay. The authority received a \$7,000,000 PWA grant, sold its bonds without trouble to private investors, built the sewer, reduced pollution in the river, and the once baffling problem was solved.

The creation of this and other authorities was not an evasion of the law. It was the legal path for rendering an essential service to the public which had in theory always existed, but which merely had to be "discovered." As the court stated in one case dealing with an authority, similar to the Buffalo Sewer Authority and also organized in order to obtain PWA aid: "It is never an illegal evasion to accomplish

¹ See ch. 349 of the laws of New York, 1935, "An act creating the Buffalo Sewer Authority * * *."

a desired result, lawful in itself, by discovering a legal way to do it.”

Laws creating authorities have been passed with PWA’s co-operation in New York, Texas, Minnesota, California, Pennsylvania, and many other States. Today authorities are providing electric power; furnishing gas and water; operating bridges, tunnels, schools, highways, and public institutions; in fact, rendering nearly every service that a modern community must supply to its citizens. (Indeed there is even an authority operating the sun and stars in New York City’s planetarium! ²)

REVENUE BOND LEGISLATION

PWA assisted communities in developing and using another legal process to enable existing bodies to finance projects from the revenues they would derive by operating the projects. This legal process was the revenue bond; and PWA rendered notable assistance in the framing of revenue bond legislation.

Under these acts, bonds may be issued which are payable only from the net income of the project, and which are not a debt of the public body issuing them, or of the municipality or State. A water system demonstrates this principle. Under the revenue bond system, each user pays for water received; the householder for a small amount, the big industry for a far larger amount. The public body renders its service for a charge, just as a private business charges for its service. Under the old system, the debt caused by constructing such a project could be paid off only by means of a tax on all the people.

Hundreds of water systems and the like were built by means funds obtained through the issuance of revenue bonds.³ These are now being used throughout the Nation—testimonials to the efficacy of this revenue bond procedure. Kentucky needed new schools, but could not incur any new debts.

² Not a PWA project.

³ An outline of the characteristic provisions of a revenue bond law may be found in the appendix, preceding the tables.

That did the school children no good. However, cities and counties could issue revenue bonds. They applied to PWA for a loan and grant. They built the schools with such aid. These schools were leased to the school districts, which paid the rent out of school taxes, and the rent is paying off the revenue bonds. The result is Kentucky children are going to school in 276 modern, safe buildings, which they would not have had otherwise.

The enormous value of these legal devices cannot be measured solely in terms of past PWA programs. Today they enable communities to meet other current financial needs, as well as to combat future economic crises.

It was obvious from the start that these new types of legislation would have to be sustained in the courts if they were to be worth the paper they were written on. Until the courts upheld these new PWA laws, a citizen might drink unconstitutional water, or cross an unconstitutional bridge, or be operated on in an unconstitutional hospital. Therefore, as soon as these new laws were passed, test suits were started. And the local lawyers said to PWA's lawyers, "You helped write these laws, now you can help defend them." PWA welcomed these tests, so that the validity of these measures would be clear.

Working side by side with local counsels in preparing the cases, PWA lawyers rendered valuable aid in defending their handiwork. Very few cases were decided against the new laws. Those decisions which suggested changes were strictly followed, and the changed procedures were duly tested in later court proceedings.

COURT LITIGATION

Most of the suits were test cases brought to establish a clear legal basis for the bonds issued under the new laws. However, in some cases the actions were far from friendly. In fact they were definitely brought to hinder the program. The climax came in the suits challenging the legality of PWA itself. Almost all of these suits were started by the power companies shortly after PWA made allotments for power

projects, and dragged on for 4 years before the Supreme Court settled them once and for all. These suits spared no time on small matters. They challenged the constitutionality of PWA, the delegation of powers to the President and the Administrator by Congress, the right of a public body to build the project, and the right of a public utility to be free from competition. A few of these suits involved gas or water works, but the great majority were brought by power companies.

Over 100 suits were brought in scores of courts. The charges of unconstitutionality were similar in all of them. Injunctions were granted with a unanimity that reflected the legal philosophy of the time.

Of course, the injunctions brought work to a standstill. Sixty million potential man-hours of desperately needed employment were tied up in the courts. Additional millions of man-hours on construction sites and in the Nation's industries hung in the balance.

PWA lawyers went into action. Although the Department of Justice actually defended the suits, and ably carried on the 4-year legal battle, PWA bore the brunt of preparing the cases. Up and down through the Federal courts the battle raged. Test cases were selected from the scores available. On the outcome of these test suits, the future of the Nation's recovery program rested. The case brought by the Alabama Power Co. against Harold L. Ickes reached the Supreme Court first on its merits, and it was this case which decisively settled the matter.

The Alabama Power Co. claimed in a suit brought in the District of Columbia courts:

1. The law creating PWA was unconstitutional.
2. Even if the court found the law constitutional the Administrator was exceeding his power under it.
3. The Administrator was conspiring with municipalities to help them build publicly owned plants unless the power companies reduced their rates.
4. If the plants were built, the power companies would be deprived of their property without "due process of law."

The Administrator in his reply to the charges stated:

1. PWA was authorized by the Constitution which states "Congress * * * may appropriate funds for the purpose of promoting the general welfare * * *." PWA was being administered according to the terms of the law.
2. The communities were authorized by State law to build the plants. The Government made no distinction between power plants and any other authorized project.
3. Since the cities had power to build and operate plants in competition with the power companies, the companies had no standing in court to question the source of the funds.

The Federal court of the District of Columbia granted a preliminary injunction, but, after hearing the case, dismissed the suit against the Administrator. That was back in 1935.

Undaunted, the power company tried the court of appeals. That court reexamined the complaint, and decided that the case should be sent back to the district court for trial.

In the meantime, the court of appeals granted an injunction. The district court again dismissed the case, and so the power company tried the court of appeals a second time, but this time the court of appeals also dismissed the case.

The power company did not give up. It appealed to the United States Supreme Court to take an interest in the company's plight. The Supreme Court heard the case in December 1937. On the first decision day in 1938, on January 3, the Supreme Court settled the case for good and all, on the ground that the power company had no legal right to complain that the municipalities were receiving PWA aid. Mr. Justice Sutherland who wrote the Court's opinion, said:

* * * these municipalities have the right under State law to engage in the business in competition with petitioner, since it has been given no exclusive franchise. If its business be curtailed or destroyed by the operations of the municipalities, it will be by lawful competition from which no legal wrong results.

* * * * *

John Doe, let us suppose, is engaged in operating a grocery store. Richard Roe, desiring to open a rival and competing establishment, seeks a loan from a manufacturing concern which, under its charter, is without authority to make the loan. The loan, if made, will be *ultra vires*. The State or a stockholder of the corporation, perhaps a creditor in some

circumstances, may, upon that ground, enjoin the loan. But may it be enjoined at the suit of John Doe, a stranger to the corporation, because the lawful use of the money will prove injurious to him and this result is foreseen and expected both by the lender and the borrower, Richard Roe? Certainly not, unless we are prepared to lay down the general rule that A, who will suffer damage from the lawful act of B, and who plainly will have no case against B, may nevertheless invoke judicial aid to restrain a third party, acting without authority, from furnishing means which will enable B to do what the law permits him to do. Such a rule would be opposed to sound reason, as we have already tried to show, and cannot be accepted.

Every court of appeals had found the PWA law constitutional, and the Supreme Court ⁴ did not even rule on that point. There has been no further attack on this ground.

One by one the injunctions were dissolved, and by the end of 1938, the communities which had been tied up in these suits were proceeding with their projects. The PWA defeated or successfully coped with every attempt to challenge the validity of its work in this way.

PROJECT EXAMINATION

In the meantime, while enabling legislation was being perfected, PWA was faced with a tremendous task of legal administration on works which were already under way. Several billion dollars worth of projects had to be built in accordance with the hundreds of thousands of laws applicable to the thousands of legal bodies throughout the country. And care had to be taken that every cent of that money would go for the purpose for which it was intended by Congress.

From the time the application was first made, when PWA had to determine whether the applicant legally was able to build the project and issue the bonds, PWA's job was to see that every legal safeguard was met, and to simplify and codify the rules and regulations so that men could be employed expeditiously, lawfully, and justly.

PWA lawyers, in each of the regional offices, familiar with

⁴ At the same time the Supreme Court took parallel action in a similar case, that of *Greenwood County v. Duke Power Co.*

local laws, were able to help communities with their legal problems as fast as they arose, and oftentimes to ferret them out before they arose, so that construction might flow smoothly along its way. Under this phase of the work, PWA drew up 16,697 agreements with the local governments, helped to prepare 3,187 bond proceedings, reviewed 66,000 principal construction contracts, and checked all the legal steps along the way, besides providing the legal basis for the actual disbursements of funds by PWA disbursing officials.

As each new problem arose, detailed recommendations for necessary changes in local legislation were made, so that the same stumbling block would not hinder the program twice. Over 1,000 drafts of local laws have been prepared by PWA, and nearly 500 have been used as the basis for legislation.

The new laws and the standardized procedures with which many a municipality is now familiar, enabled the PWA to get under way in 1938 with record speed. The broader scope of social service that a modern municipality gives to its citizens is due in good part to the uses of the new techniques such as the public authority and the revenue bond acts. PWA has acted as a pioneer in the development of a new field of enlarged municipal service. But the legal Utopia has not been attained. To meet any future emergency with minimum delay and with maximum success, local governments may have to continue to consider additional amendments to various laws.

Chapter V

Loans and Bonds



WHEN the factory in Anytown closed and the workers lost their jobs, things began to happen to the very life of the community. The factory not only disappeared as the community's backbone of employment, but the workers, unable to pay the taxes on their homes, deprived the community of revenue at a time when it was most needed. As the depression deepened, some of the workers forfeited their homes, and went to other localities to search for employment. As a result, property values in Anytown were further depressed and tax income was lowered even more.

During such periods, virtually all communities "tighten their belts," attempting to conserve their funds by various

operating economies. But there is a limit to how far this process can be carried without serious consequences. A town cannot discharge its policemen or firemen, or shut down all its schools. If only to protect its capital investment, a town must maintain its plant—keep its streets, schools, sewers, and other properties in good repair. Changing local conditions may even make it necessary to undertake new public construction. A variety of financing problems are then introduced.

In the first place, the amount of money which a municipality can borrow is limited, nearly always to a certain percentage of its property values. Consequently, when real-estate values are depressed, the amount of bonds it can issue is greatly reduced. In the second place, investors uncertain of the outlook are loath to buy the municipality's bonds; and communities which are in a position to issue bonds are forced, therefore, to pay a high rate of interest if they can sell them at all.

When PWA was organized, communities throughout the United States which attempted to finance public works found themselves in just such a situation. Some were virtually bankrupt; others were severely hampered by Constitutional and statutory debt limitations. Even those which were considered "wealthy," and were able to issue bonds, had to pay exorbitant interest rates. The leading cities found it impossible to borrow money at less than 5 percent.¹

FINANCIAL CRITERIA

Some way had to be found to enable communities to raise their share of the costs of public works. The ultra-conservative lending policy of bankers could accomplish little, but neither could PWA throw its money away. PWA found it necessary to establish financial criteria which would be sufficiently elastic to permit cities to participate in the program and yet meet the requirement of Congress that such

¹ In June 1933, the Bond Buyer's index of municipal bond prices of 20 "standard" cities stood at a yield at 5.7 percent, and its index of 11 "first grade" cities at 4.9 percent.

loans be “reasonably” secured. It was up to PWA to determine the terms of the loans, and the types of security and rates of interest.

PWA therefore adopted two simple criteria:

1. The bonds had to be valid and enforceable; and
2. There had to be reasonable assurance that they could be repaid with interest over a period of not more than 30 years.

At the same time, PWA decided not to compete with private investors, but rather to encourage the private sale of bonds and thus help to restore the municipal bond market. It did not concentrate on “high-grade bonds” which would be readily salable. Furthermore, it established an interest rate of 4 percent, with the thought that this would be low enough to help communities in need of assistance, and yet high enough so as not to interfere with private investors in a normal municipal market. The fact that good municipal bonds were quoted at 60 or 70 had no influence on PWA. It purchased companion issues at the full face value, paying \$100 for every bond having a redemption value of \$100. For example, New York City’s 4 percent bonds were selling at 77 in December 1933, but PWA bought a similar issue at 100. And this faith was rewarded, for these bonds were later resold to private investors at a profit.

POLICY IN PRACTICE

PWA took a liberal and helpful attitude, making full allowance for the depression period, especially when these difficulties appeared temporary and the community had a good past record. It anticipated improved financial conditions which would reflect increased values of taxable property, better tax collections, and brighter prospects for revenue from income producing projects. It granted loans unhesitatingly where future stability and growth held promise.

In many cases, PWA worked actively with public officials in smaller communities, suggesting ways of revamping their financial structures. This not only helped them in qualifying for a PWA loan, but established future dividends to the taxpayers of the communities. Back in 1935, for example,

Union Free School District No. 28, Nassau County, N. Y., asked PWA for a loan and grant to build a high school at Long Beach, Long Island. Its finances were muddled and getting no better. PWA told the district it would like to help, but that it must first help itself. PWA pointed out that a more aggressive effort to collect taxes would cure most of the troubles, and would stop a dangerous habit of deficit borrowing. When the old high school was seriously damaged by the hurricane in 1938, the district came back saying that a new building was desperately needed. It also reported that it had followed PWA's suggestions and supplied evidence that it had put its financial house in order. A PWA loan of \$460,000 and a grant of \$376,363 were allotted and construction of a new high school was begun at Long Beach. Later, the school district notified PWA that the loan would not be needed after all, as it had received a bid for its bonds at less than 4-percent interest.

At the same time, PWA discouraged communities from improvident public works construction. It has made every effort to avoid creating or increasing indebtedness to the point where it was likely to prove excessive and a source of financial difficulty outweighing the benefits derived from the improvement. PWA wanted no part in loading a white elephant on a community, and at times was forced to prick the bubble of local superenthusiasm.

STANDARDS OF APPRAISAL

PWA concluded the majority of loan agreements without the benefit of any personal contact between lender and borrower. To send an expert to each of the thousands of communities wanting loans would have required an enormous staff, and might have delayed the program for years. So the financial experts devised a new technique in the determination of municipal credit responsibility. This consisted of a questionnaire which, if answered fully and correctly, would give a reasonably reliable picture of the ability of the community to repay the loan requested.

This method, in general, proved to be simple, expedient,

and efficient; but in the case of revenue-bond financing of public works it presented many problems. There were no existing examples of financing many of the types of projects through issuance of revenue bonds. PWA was compelled to start "from scratch" in developing bases of appraisal and other standards for such obligations.

This was particularly difficult in the first 2 years of operation when financial analysis of local applications was handled entirely in the central office. Success was possible only because of the availability of a trained staff of engineers familiar with the construction and operation of municipal utilities and of finance examiners familiar with municipal credit problems. Since standards of appraisal were of necessity based on average conditions, it was only natural that occasionally a community did turn out to be of a very different nature from what it appeared on paper, and in many surprising respects. But common, practical sense avoided many pitfalls, such as the case where the entire population of a community would have had to die three times to pay out a revenue loan for a municipal cemetery, or where the entire feminine population of a community would have had to give birth to children on the average of once every 5 months to pay out a loan for a municipal maternity hospital. PWA found it difficult on occasion to sift out the true facts in deceptively glowing earning statements of water or sewer systems, or harbor developments, as projected by enthusiastic applicants. This task was made easier, however, when the PWA technical staff was decentralized and came into personal contact with communities, their problems and prospects.

LEGISLATIVE AID

PWA could not have answered the urgent needs of communities for financial assistance merely by the development of suitable financial criteria. PWA (as the preceding chapter explained) also sponsored State and local legislation providing new means of financing public improvements and simplifying the procedure for the issuance of municipal bonds. This was necessary because the lack of flexibility in State

and local laws denied many communities the right to finance works which were not only socially desirable but were economically sound—projects which were able to produce income sufficient to support the cost of their construction and operation.

This legislation provided for the issuance of various forms of non-tax obligations through which revenue-producing public enterprises could be financed. It thus served to set up the services of the community on a businesslike basis. The repayment of the cost of the projects came to depend on the income they produced, rather than on the ability of the community to collect property taxes.

In order to finance certain projects which were beyond the scope of the bonding capacity of any single community, new forms of quasi-municipal corporations, generally called "Authorities" were created in many instances.

REVENUE BOND FINANCING

Through the purchase of revenue bonds, PWA has financed many hundreds of waterworks, sewer systems, electric and gas improvements, and various other public enterprises for communities of all sizes, even down to villages of 400 to 500 people. In some cases, the problems of working out a basis of financing a \$15,000 waterworks system were no less complicated than those involved in a \$20,000,000 toll bridge or tunnel, and received no less attention.

The need of the city of Fort Smith, Ark., for a new water supply is a case illustrating the numerous problems worked out with PWA applications. Originally, the Fort Smith Water District requested \$1,650,000 for a water supply system, but PWA's lawyers found that the district had no legal way of borrowing the money needed.

After numerous conferences between the city officials and their representatives and PWA's representatives, a plan was worked out for the construction of a waterworks system. The money was to be raised by Waterworks Revenue Bonds. It was arranged that the city sell water at wholesale to the water district, which owned and operated the water distribu-

tion system in the city, and that the water district continue to retail it to the residents of the city. Several legal snarls had to be untangled, since the water supply system was to be entirely outside of the city limits, and nobody was sure that the city had authority to build anything outside its boundaries. It was also necessary to work out a valid contract between the city and the water district covering the sale of water during the life of the loan. All the difficulties were ironed out, and the plan subsequently received the approval of the Arkansas Supreme Court. Similar plans have been used since in a number of other analogous cases.

PWA has made mistakes, of course, but surprisingly few considering the vast amount of pioneering involved in such financing. In its extensive experience with this type of financing, the organization has made constant refinements in its criteria of appraisal and has fully tested its scope in the courts. These test cases not only have protected PWA's loan transactions, but have served to lay the groundwork for such financing so carefully that communities now find it possible to sell such bonds to private investors upon very attractive terms.

Revenue bond financing, according to PWA's experience, is not only sound in theory, but also fosters a more equitable distribution of the charges for some municipal services. In other words, it makes it possible to charge some of the costs of a project against the users according to the benefits each user gets, rather than arbitrarily against the owners of real estate. For that reason, new public projects in the future will tend more and more to become self-supporting. (The trend toward revenue bond financing of PWA projects is shown in table 4 in the appendix.)

PROFITS AND LOSSES

Up to March 1, 1939, PWA had made loans totaling \$822,139,340, of which more than half already had been collected. The repayment of some of these loans, and the sale or redemption of a majority of the bonds which PWA had obtained as collateral for its loans, have brought \$484,-

790,000 back into the Treasury. In selling these bonds, PWA,² in a great many cases, received bids far above par from the public. As a result, the Government has made a profit of almost \$12,000,000 on bonds resold thus far—the very same bonds that private investors previously had been unwilling to purchase. PWA considered this especially noteworthy in view of the fact that it had paid par for these bonds when similar issues were selling at “distress” prices.

Naturally, PWA sold the best of the bonds in its portfolio. It feels, nevertheless, that a very great majority of the issues which it retained can be liquidated in full. It fully expected at the time the loans were made that some of the issues might be troublesome in the early stages, and that payments of principal and interest might be late. This expectation was based on the knowledge that it nearly always requires considerable time for a water or sewer system to establish its earning power. A community may find, for example, that several potential customers are slow in using the municipal services because they want to make their last payments on their automobile, or pay the dentist, before they install connections for the water system or sewer system or gas system. But in such cases, careful nursing of the loan through the organization period has been found helpful.

PWA found only a few instances (involving borderline cases which received the benefit of the doubt) where the loans seem to be definitely beyond the capacity of the community to repay. Out of the total of \$704,930,097 of bonds purchased, only \$675,788 of principal and \$1,570,887 of interest were delinquent on March 1, 1939. This involved only 325 issues out of nearly 2,900 purchased. The vast majority of these delinquencies can be corrected without serious difficulty. Comparing the volume of delinquencies with the total amount of bonds purchased by the PWA, the Government may expect in the end almost complete recovery of the funds loaned through PWA. Practically all borrowers have shown a serious regard for their obligations.

² Bond sales were for the most part made through the RFC.

MUNICIPAL CREDIT

Soon after PWA began buying municipal bonds, municipal credit began to improve and interest rates began to decline sharply. Consequently, an increasing proportion of municipalities found it possible to sell bonds more advantageously in the general market than to PWA, at PWA's rate of 4 percent. Communities turned less and less to PWA to obtain the loan portion of their project costs. In the first program initiated in 1933, local public bodies were able to provide through their own resources only 35 percent of the total cost of their public works. In the 1935 program, local funds increased to 45 percent of the total cost. In the current (1938) program the proportion reached 52 percent.³

The trend is even more pronounced than is indicated by the percentage figures, since PWA had in the meantime increased the amount of outright grant which correspondingly reduced the amount of money that had to be provided by the community.

An important factor in this shift from Government to private financing has been the successful experience of PWA with certain types of municipal obligations, notably revenue bonds, previously regarded with much distrust by private capital. The fact that PWA developed acceptable standards for these obligations, and clarified their validity and enforceability through legislation and court interpretation, has given them a more respectable standing in the financial markets.

IS FEDERAL AID NEEDED?

Since economic conditions have improved and private capital has participated more in the financing of public works, PWA has attempted to determine the desirability or necessity of continued activity on the part of the Federal Government in this field. The 6-year experience of PWA with all types of such projects suggests that even under favorable economic conditions, certain useful and urgent public works projects must continue to rely upon Government aid.

³ See table 6 in the appendix.

Predominant among this group are the major stream pollution projects, involving the large scale construction of sewage disposal facilities. Government sponsorship and financial aid have been instrumental in attaining the cooperation of the various municipal units along a stream. Without such cooperation many of these ventures would have been unsuccessful. In several instances these projects involved conservation problems of national concern. PWA's part in cleaning up the Raritan River, by aid to a number of municipalities (see ch. XII) is a case in point.

Large scale public works projects of the income-producing classification, such as the Overseas Highway in Florida and the Triborough Bridge in New York (see ch. XVIII), which must be financed through revenue bonds, will most likely also continue to require Federal assistance. Private capital is traditionally reluctant to finance such projects because of the prolonged construction period, the chance for unforeseen developments to increase construction costs materially, and the uncertainty as to actual revenues. All these factors make such bonds speculative until the earning power of the facilities becomes well established.

PWA's analysis of its financing has also shown that the need of future Government aid is by no means confined to the large scale public works. Many small communities today have water or sanitation facilities because a PWA grant reduced the required bond issue to the point where the limited resources of such communities could repay the indebtedness. Then too, even the favorably considered general tax obligations of many smaller communities in certain sections of the country enjoy only a local market. As a result the ability of such communities to arrange for private financing of public works is both limited and erratic.

In considering the future need of Government aid in financing public works, it is well to remember that cycles of economic depression have inevitably introduced collapses of the municipal credit structure. This has disrupted private financing of public works. If it is essential to economic stability to maintain a balanced volume of public-works

construction with its collateral influences on employment and heavy industries, it then follows that the Government should be prepared to make available at such times a reservoir of credit to aid in the financing of all types of public-works projects.



HEALTH BUILDING AT THE UNIVERSITY OF MINNESOTA, SHOWING THE APPLICATION OF MODERN ARCHITECTURAL DESIGN. THIS STRUCTURE IS ONE OF 662 PWA COLLEGE PROJECTS

Chapter VI

Engineering Blueprints



PUBLIC works of an enduring character, and of lasting benefit must be carefully designed to meet the needs of each community efficiently and economically. A modern mail-order house performs a remarkable variety of services, but we have not arrived at the stage where a mayor can open the catalog, select a nice looking bridge, fill in the order blank, and have the postman deliver it in a neat package ready to use. Every bridge, every sewer system, every school, even the jails must be tailor-made, designed for the site and the needs of the community. This calls for engineering ability of a high caliber. Too often in the past it has been a matter of coincidence that municipal improvements turned out as expected.

But it is by no means mere coincidence that PWA projects measure up to the finest standards of construction.

PWA from the beginning has insisted that public works projects be designed to meet the needs of communities intelligently, and has refused to take part in dissipating taxpayers' money through extravagance or improvidence in planning. In this effort, PWA has had the advantage of an expert engineering staff, made up of outstanding authorities in all the fields of construction. Among these have been officers of well-known engineering societies, outstanding architects, men who have helped to build the Nation's railways, men who have built water systems for European and South American nations, men who were in charge of construction at the Panama Canal, others who have designed and constructed outstanding buildings, and executives of great construction companies. They were drafted for service not only because of their knowledge in specialized fields of construction, but also because they had the additional capacity to evaluate the social desirability of projects. They were able to determine whether a project proposed by a community could actually fill the purpose intended. That is still something that a slide rule cannot do.

TECHNICAL ASSISTANCE

Thousands of our communities are intimately familiar with the schools, hospitals, city halls, roads and bridges, water and sewer systems constructed under PWA sponsorship. These projects affect the well-being of millions of our citizens, and are uniformly a source of civic satisfaction and pride. Very few citizens, however, have any idea of the painstaking role played by PWA in making these projects satisfactory to the communities.

Suppose Anytown needed a new school. For many years Anytown mothers left their children at the door of the rickety old school building in the morning, disturbed by obviously great possibilities of fire. Their misgivings became an increasing topic of discussion at the parent-teachers' meetings and various women's clubs, and the movement for a new school

building gained increasing momentum. Finally, the matter was made the subject of a local referendum. The town voted overwhelmingly for the project.

At this point Anytown discovered that a new school building would place a heavy strain on the community's limited finances. The town officials, therefore, applied to PWA for a grant to ease the burden. The PWA traveling engineer helped them to fill out a questionnaire which showed what Anytown wanted to build and how the local citizens proposed to finance this construction. The application contained a local architect's sketch of the proposed building. PWA, recognizing that each community has its own problems and its own ideas, left the matter of design, as usual, to the community itself. While PWA would not dictate the choice of architect or engineer, it did show a reasonable prudence in assuring itself of the designer's ability to do a good job, especially since the Government was to pay 45 percent of his fee.¹ But in this case it was satisfied that the job would be done right.

When this questionnaire reached the PWA regional office, it was subjected to the customary legal and financial scrutiny. The engineers then thoroughly analyzed the project for structural or planning defects. They searched the application for answers to several questions: Is the school adequate for the population? Will it take care of future growth? Is it too big? Does it have ample space for playgrounds? Does it fill modern school requirements? Is the building safe? Can it be built for the money available? In order to answer this last question, costs were broken down item by item and compared with similar buildings nearby. The engineer responsible for the determination of these questions was an expert on school buildings in the area, and before he was through with his analysis he knew fairly well just how the project would conform with what the community had in mind.

¹ PWA has always insisted that competent engineers and architects be provided by local communities to take charge of their projects. It has realized the necessity for proper recompense for these important technical advisers and has provided that they may be paid reasonable fees for their work. Nearly 6,000 engineering and architectural firms and individuals have participated in the program.

The plans were then scrutinized to determine whether the standards of construction complied with the best and most modern practices. Before he was through the engineer might have called in other specialists for their advice on miscellaneous technical details. A structural engineer might have been asked to go over the steel framework to see if it measured up to the best practice. A mechanical engineer might have made suggestions on the heating and ventilating system.

By the time this engineering staff had studied the project item by item, consulted with the local architect, suggested changes, and finally given their approval, Anytown was assured of getting the most for its money. In this way, PWA engineers all over the Nation have helped to raise the standards of construction.

FINANCIAL SAVINGS

PWA's advice has saved many communities thousands of dollars. In years gone by, some communities, for example, plunged into the expense of constructing an elaborate water system only to find that no water was available to operate it. But PWA, except in rare instances, has not permitted its funds to be expended for the construction of water distribution systems until the availability of a sufficient supply of good water had been clearly established.

In one case, an Alabama village had spent \$4,000 to sink a well which in the end proved to be dry. It abandoned all hope of a modern water plant until a PWA engineer recommended turning to a forgotten spring supply that proved to be ample and perfectly good. On another occasion where expensive drilling was producing poor wells, PWA suggested using a river supply of water and cooperated with the town's engineer to replan the project.

PWA has always helped to reduce health hazards. Before construction on a water supply project is approved, it must be satisfied that there are no health hazards in the source. Furthermore, it makes a careful check of all sewage disposal projects to see that no health hazard is removed from one

locality to become a menace in another. In areas where fluorides are found in water supplies, it has brought to the attention of the communities this danger to the health of children and has required wherever possible the substitution of another source of water supply. Many communities are forced to depend upon a water supply which has a high iron content. While this in itself is not a health hazard, the presence of iron in water causes damage to plumbing fixtures and textiles. In such cases, PWA has required that adequate treatment for removal of iron be constructed.

In still other cases, PWA has enabled several towns to build a common sewage disposal plant, resulting in substantial savings to these communities. Carlstadt, East Rutherford, and Rutherford, N. J., each applied for a separate sewage disposal plant representing a total outlay of \$931,000. PWA suggested a single combined plant. After several meetings at the PWA office, a joint plant was agreed upon costing \$887,000, or a savings of \$44,000. This plant, with its greater capacity, has been estimated to save over \$14,000 per year in operating costs. Many a community has benefited by such advice.

BUILDING SPECIFICATIONS

Once satisfied that a given project fits a community's needs, and an allotment of funds has been made for that project, PWA always has taken additional steps to protect the public's dollars. Even prior to construction—shortly after a contract has been drawn up between the community and the Federal Government—PWA examines carefully the detailed plans and specifications which give exact directions as to how the project is to be built from the time the first shovelful of earth is turned up to the time the completed job is tested for use.

PWA has found its precautions in that direction well rewarded. By correcting the wording of clauses liable to misinterpretation, it has prevented in many instances excessive costs to the taxpayers. Some of these were easy to

detect and correct—such as that found in the specifications for the steel framework of a jail project. Tucked away among the stringers, plates, and girders, were provisions for four seven-passenger limousines at \$5,000 per limousine.

Not so easy to detect have been those specifications that prevent a reasonable number of contractors or manufacturers of material or equipment from bidding on a particular item. PWA has insisted on free and open bidding competition. This keeps prices to a reasonable level; and serves as the best and most equitable way of distributing Federal recovery funds to all units of the industrial system.

PWA has approved specifications only after it has been given reason to believe that they would tend to give the community what it wants in quantity and quality, and would permit all firms producing the type and quality of article desired to compete for the business. If, on the other hand, there happened to be clauses that would unduly restrict competition, or were not in line with the best construction practice, PWA has returned the specifications for changes.

CONTRACT BIDDING

PWA has also observed the press advertisements for bids, and has always had representatives at the openings of bids. The case of a bridge project in New York State is representative. The sponsors advertised that sealed bids for a bridge would be received at a specified time at the city hall. After two weeks or so of careful estimating on the part of contractors the time came for all bids to be sealed and filed. The bids were opened in the presence of PWA and local officials, together with representatives of material manufacturers, who were on hand to sell everything from carpet tacks to zinc to the successful bidder.

The X Co. was found to have offered to do the work for the lowest price. The PWA representative began to check up immediately to determine whether the lowest bidder was "qualified." He found that the X Co. had had extensive experience in bridge construction, and in fact had just satisfactorily completed a PWA job on schedule in a nearby State.

He also noted that the company had submitted a bank statement showing that it was financially sound and able to finance the preliminary steps in the project, and had also submitted a certified check for 5 percent of the cost of the job as "earnest" money. As the bid of the X Co. was below the estimated cost, there was plenty of money available to complete the bridge. Local officials thereupon with the concurrence of PWA awarded the X Co. the contract and ordered it to move in its equipment, place its material orders, hire its men and go to work.

Before work began, however, the company filed a performance bond as required by specifications. Such a bond guarantees that any PWA job started will be completed satisfactorily. If the completed project fails to meet the required tests, or lags behind schedule, the bonding company would have "to make good." PWA's requirement of the performance bond has protected millions of dollars of public money. PWA also requires every contractor to provide insurance for his workmen.

PWA INSPECTION

With the actual start of construction, a PWA resident engineer inspector is sent to help local officials, and to see that PWA's rules and regulations are followed. This resident engineer holds a unique position for he has no power over the contractor. The contract for a non-Federal project is always between the contractor and the local officials. All he actually does is observe developments and suggest necessary changes to the local officials, and also report to PWA. If he should determine that any of the work does not conform with specifications, PWA can withhold grant funds. The resident engineer must see that PWA's labor regulations are carried out.

PWA has maintained representatives on all its projects. One resident engineer often can handle several projects, if these are located in one vicinity. On the other hand, large construction projects such as the Chicago subway or the Los Angeles schools require a project engineer with a staff of

specialists to patrol the various engineering features of the work. Reputable contractors welcome PWA representatives on their jobs, for the fact that PWA considers a contract a document to be followed explicitly at all times, not just when convenient, helps them to plan and carry out their work. Many of them have stated that PWA requirements are a guarantee of steady work for reputable contractors, since "chiselers" find it impossible to operate under this rigid supervision.

DELAYS AND CHANGES

PWA has never permitted unjustified delays in construction and has endeavored always to impress upon communities the necessity for prompt completion of work. It requires that early in the prosecution of a project, a schedule be set up, timing the various operations to completion, and exercises close supervision throughout the succeeding stages of construction to see that this schedule is lived up to as far as possible. With very few exceptions, the communities and their engineers, architects, and contractors, have cooperated to produce what is perhaps the fastest construction program of its magnitude in history.

Since it is almost impossible to build a project without some necessary and unforeseen changes, PWA maintains a degree of flexibility in its control to permit work to proceed without undue delay. For example, in the construction of a school building in Keyser, W. Va., it was found, after the contractor had opened up the excavation, that the character of the soil was different from that disclosed by the preliminary survey. Water from springs was encountered. In order to insure a stable structure, it was necessary to carry a portion of the foundation walls deeper, and install tile drains. The school board's architect presented a statement of facts, together with the cost data, to the resident engineer inspector, who reported upon the conditions to the regional director. Satisfactory arrangements were concluded which permitted the project to proceed.

Across the Nation, similar problems come up every day,

are dealt with, and construction goes on. In thousands of communities PWA engineers are now helping local officials with their troubles, keeping the job flowing along, keeping men at work. Almost every day, some projects reach completion; the final grant check is paid; the contractors and the workmen go on to other jobs, the PWA engineer moves on to another project, the municipal bosom swells with pride over the new civic improvement

SURVEY OF PWA STANDARDS

What have been the results of PWA's supervision and assistance? Have the standards of construction been raised? If the standards have been raised, have the costs gone up? What do the communities throughout the Nation think about the results?

The answers to these questions have long been the subject of conjecture. The President's Committee on Architectural Surveys has asked these questions of hundreds of communities, architects, and engineers throughout the country. Seven hundred and seventy-three local authorities, a representative cross section of communities throughout the Nation replied. Their replies to the questionnaires give the answers.

The first question was: Do you consider that PWA regulations have resulted in higher standards of planning? The answers were as follows:

Yes 512 70 percent

No 197 30 percent

Have they resulted in higher standards of design?

Yes 436 65 percent

No 231 35 percent

Have they resulted in higher standards of construction?

Yes 544 78 percent

No 155 22 percent

Of course, PWA could not have raised standards by an equal amount everywhere. Some communities have long had rigid standards of their own, and have built up staffs capable of enforcing them. PWA regulations have tended to bring other regions into line with the best.

Now it might be supposed that higher standards of planning, design, and construction would bring higher total costs of construction. Always, of course, because of the PWA 45 percent outright grant, the cost to the community would be less, but the question of total cost was unsolved. So the question was asked: Do you consider that the construction cost of your completed work was greater under PWA than it would have been without PWA? The answers came back:

Greater	369	54 percent
Same or less	319	46 percent

In those cases where the cost was said to be greater, the question was asked: Were costs greater due to PWA provisions for prevailing wages and other regulations pertaining to labor? The ratio of replies was:

Yes	296	92 percent
No	33	8 percent

Thus, most of the extra cost was due to better wages. Other surveys have indicated that, where the costs were believed to be higher due to PWA regulations, the increase amounted to only 1 to 4 percent.

Trying to find out how costs could be lower under PWA, the committee asked the question: Have there been better standards of competitive bidding? The answers showed:

Yes	425	70 percent
No	185	30 percent

Another question revealed an interesting point in relation to cost. The communities were asked: Are your maintenance costs greater or less as a result of PWA? The survey showed:

Greater	58	18 percent
Less	269	82 percent

By the testimony of those who have built under PWA regulations, PWA has contributed materially and definitely to raising the standards of the construction industry throughout the Nation. This contribution has been made primarily by the PWA engineers which have guided the construction program, and by the PWA investigators whose vigilance has enforced the standards which have made the PWA sign the hallmark of quality in the construction field.

Chapter VII.

Honest Dollars



EVERY construction job has its quota of "sidewalk superintendents." To realize the number of voluntary critics which PWA has had, one must multiply by 34,500 projects, and then add in those who have gathered their notions about public works from hearsay and newspaper reports. PWA has been operated in the open, where everyone could see, and has forestalled possibilities of error as much as possible. It has maintained an organization and policy that were as flexible as possible. Considering the vast number of legal, financial, and engineering problems, not to mention broad questions of public policy, the fact that it has satisfactorily completed 26,508 projects and has initiated almost 8,000

more is a tribute to the American way of doing things.

Whatever the criticism, no charges have ever been brought that PWA was unfair to labor, or that it has been negligent in its duty of safeguarding the public purse. In supervising the labor relations between thousands of private contracting firms and millions of workmen of every description and skill, PWA has been ever mindful of its duties to the workmen who have performed the jobs, to the contractors who have hired the men, and to the taxpayers who have paid for the projects.

PWA's insistence on reasonable standards for workers and for open and honest conduct in the construction of its projects has not only resulted in a record unblemished by scandal but also in a far more stable construction industry.

When the first spadeful of earth was turned on the first PWA project, the Nation was suffering from the greatest surplus of labor in its history. Labor, like any other commodity, is subject to the law of supply and demand if it lacks cushioning controls. Whenever there is a surplus, whenever hordes of men walk the streets looking for work, the wages of labor tend to be driven down. And that depression of wages cuts deeply into the workers' purchasing power and lowers the national income.

PROTECTION OF LABOR

A democratic nation never could be a partner in any attempt to limit the economic freedom of working men or abet any efforts to drive their wages down. The Federal Government would have defeated the whole purpose of recovery by so doing.

Congress forestalled any such possibility when it provided in the Recovery Act (NIRA) that "all employees shall be paid a just and reasonable wage * * * sufficient to provide living in decency and comfort."

To carry out this mandate in the face of a disorganized and distressed labor market, created unforeseen problems. There were questions of where to recruit labor, preferences for local labor, and particularly what rates were to be estab-

lished. PWA made its start by creating a zone system of minimum hourly rates, recognizing that wages varied in different sections of the country. The Administrator established the following:

Zone	Skilled labor	Unskilled labor
Southern-----	\$1.00	\$0.40
Central-----	1.10	.45
Northern-----	1.20	.50

These rates were not as rigid as they seemed. For example, PWA made allowances for different classes of workmen who could not be considered unskilled laborers.

PWA made no pretense that these wage rates were perfect, especially in view of the fact that it had to deal with differences between rural and urban labor, and local and nonlocal labor. Adjustments constantly had to be made, but the regulations served the purpose in the beginning of preventing undue advantage being taken of workers. As employment increased, and such controls were no longer necessary, PWA undertook in 1935 a policy of setting wage minimums in accordance with the rates prevailing in the locality where the work was undertaken. At present, the sponsors of the projects determine the rates for workers, and these provisions are embodied in the contracts which are let, thus permitting the bidder to know in advance just how much his labor costs will be.

These requirements at first brought forth many protests. Many communities tried to set the prevailing rate at the lowest possible figure that any man in the community could be induced to work for. PWA could not agree to this, and requested that rates be the same as those paid for similar work in the locality. When this was determined, a few communities contended it would raise the cost of their public works excessively. Yet in scores of cases, the bids, with the higher labor rate, proved lower than originally estimated on a cheaper wage scale.

The reason for this startling anomaly was easy to find. Contractors found that paying good wages brings good men, who do better work quicker, and therefore cost him less.

SELECTION, HOURS AND DISPUTES

In an effort to spread the benefits of construction jobs, the recovery act required that a maximum 30-hour week be put into effect, insofar as practicable. But there were various difficulties in the way. While the 30-hour week did spread work, it tended to raise the cost and to slow things down where lack of daylight made it impossible to operate two 6-hour shifts. And so, the policy was changed to a monthly limit of 130 hours, and then to the standard 40-hour week prevailing in the construction industry. Likewise, early attempts to require an arbitrary proportion of relief labor created difficulties, especially in cases where contractors had collective bargaining agreements with labor unions.

PWA's current rules in this regard are simple: A union contractor gets his men from the proper unions. Preference is given to those on relief. If the union cannot supply a man for the job within 48 hours, the contractor applies to the National Reemployment Service. A nonunion contractor, on the other hand, applies directly to the National Reemployment Service, which sends him qualified men from its lists of unemployed or from those working on work relief projects.

The whole question of labor rates and preference, as PWA anticipated, was difficult to handle, and still requires constant attention. Workers may demand one rate; owners may demand another. The opposing views may lead to a strike. While PWA is not involved in the strike, being interested only in seeing that its regulations pertaining to reasonable wages and working conditions are carried out, it is determined that the recovery program shall not lag. A strike not only means the two parties are at loggerheads, but also hundreds of other trades, and many jobs in manufacturing industries supplying materials may slow down or stop.

PWA handles its labor problems through a special assistant to the Administrator. Experts in each PWA regional office

check wage scales prepared by local officials. In 1938 these experts studied 5,452 wage rates, worked out changes with local officials in 2,375 projects. The results brought guarantees of increases of \$22,512,724 in wages to labor. More than \$12,000,000 was added to minimum wage guarantees in the South alone. At the same time, PWA's handling of disputes has steadily improved.

THE "KICK-BACK" REGULATION

Setting proper wage scales in advance is one task. Seeing to it that the right man gets paid the right wage is another.

The resident engineer inspector keeps an eye on these men as they report for work, to be sure that those entitled to the work get the job. He also checks to see that they are paid according to the wage scale. In 999 cases out of a thousand, there is no trouble. But back when PWA was starting, men needed jobs so desperately that some dishonest contractors sold jobs to those men who would "kick back" the largest percentage of their earnings. A few dishonest contractors would pay the wage scale, certify boldly to PWA that this had been done, and the workmen would then be required to pay back as high as one-quarter of what they had earned, "or else ——."

PWA was determined that such practices would never be allowed on its projects. The Administrator established a Division of Investigations, responsible only to himself, to see that anyone who preyed on labor or engaged in any other improper or dishonest practices would be punished.

Manned by a crew of lawyers, engineers, and accountants, the Division of Investigations watches over proceedings in general. If a resident engineer suspects "dishonesty," if a complaint from anyone is received, PWA investigates. If criminal action can be charged, the Division of Investigations collects evidence and affidavits, and presents them to the Department of Justice and aids in prosecuting the case. In less than 6 years, the Division of Investigations has brought about the return of \$644,000 "stolen" from workmen through "kick-backs."

Prompt and thorough investigations have reduced the number of cases in which workers have to pay levies to hold their jobs. But other ways of obtaining workers at less than stipulated wages occasionally make their appearance. On the Grand Coulee Dam in the State of Washington an investigation disclosed that the only workers receiving employment from one subcontractor were those possessing certificates from the National Reemployment Service and whose certificates had certain holes punched in them. The investigators discovered that the distinguishing punches could be obtained by payments to certain employees of this subcontractor.

CASES OF MISCLASSIFICATION

Prompt investigations also have practically eliminated a dishonest device known as "misclassification." This is a simple process but sometimes exceptionally difficult to detect. It consists merely of hiring a worker at a low classification, such as "common laborer," or as "apprentice," and then having him do the work of a skilled craftsman who should receive a considerably higher wage.

Failure of contractors and owners to maintain proper safety devices for workers has also been subject to investigation. On a Memphis, Tenn., sewer project workers were required to labor under high air pressure, similar to that maintained during the construction of tunnels under water. Workers taken too quickly from the high pressure to normal pressure are subject to a serious condition known as the "bends." Although the contractor on the sewer project had agreed to proper precautions, 38 cases of the "bends," serious enough for hospitalization, were reported on the job in a single month. An investigation showed that the contractor, in order to save money, had installed antiquated chambers in which the pressure was supposed to be lowered gradually, but which had leaks that destroyed their usefulness. New equipment was installed and no more cases of the "bends" were reported.

OPEN, COMPETITIVE BIDDING

Important as protecting the workers has been, PWA investigations have covered a far wider scope. They also

have protected contractors and officials. One reason that PWA projects have been worth every dollar of their cost has been the maintenance of the principle of open competitive bidding and the approval of contract awards only to the lowest responsible bidder. By ruling out favoritism in the award of contracts millions of dollars of Federal as well as local funds have been saved

Regardless of PWA's strict rule against favoritism, efforts have been occasionally made to "throw" construction contracts to a particular bidder and more often to give a favored firm orders for materials or equipment. Sometimes such efforts are made by officeholders who want to pay a political debt; sometimes they are made out of mere friendship for a bidder; but probably most often because of a desire to see a local man get the job. But such favoritism, if allowed, would have resulted in higher prices, since few men will quote their lowest prices when they think they will get the job anyway.

PWA has encountered all sorts of chicanery of the kind that honest contractors—and this means by far the greater majority of them—would have been unable to detect by themselves. In one midwestern city PWA had made an allotment for an auditorium. The building required a large amount of steel work and most of the contractors received quotations from a steel erection company covering the steel work involved. These estimates from the steel erection company were duly incorporated in every contractor's bid. A few hours before the bid opening all of the contractors, with one exception, received telegrams from the steel company asking that previous quotations be disregarded and raising the price on steel work \$14,500. Hurriedly, the contractors changed their bids to include the additional amount. When the bids were opened, it was apparent that all of the bidders except one, who was low, had raised prices \$14,500. PWA was a little suspicious and an investigation was ordered. It developed that the low bidder, not the steel company, had sent the telegrams to his competitors. As a result the bid opening was held over again and another contractor got the job.

INVESTIGATION OF "COLLUSION"

Collusive bidding has been considerably more difficult to detect. In the case of the Brewster housing project in Detroit, six contractors, four of whom were from Detroit, submitted bids. Since the job was divided into four units, each contractor was permitted to bid on any or all of the four units. Each of the four Detroit contractors actually submitted bids on only two units. Where one of the contractors was low on one unit, he was high on the other. Only on one unit did an outside contractor submit a low bid. The trouble was that the low bids, divided among the local contractors and the outsider, totaled three-quarters of a million dollars more than PWA believed was a reasonable price.

In the face of a campaign of ridicule waged by local newspapers which charged PWA with "governmental red tape," the contract awards were held up. An investigation showed that a number of local subcontractors' associations, in conjunction with labor unions, had operated under what they called "voluntary trade agreements" by which the unions could refuse to supply labor unless the subcontractors submitted bids within 10 percent of the average. Outside contractors had been warned that they might expect trouble if they submitted bids. It was intimated that either no workers would be furnished, or if workers were furnished, they would "lie down on the job." Since the bids of the contractors were largely the totals of the bids of the subcontractors, the prices were held at a high level.

During the investigation, the local Building Trades Council published a letter saying that outside contractors would not be discriminated against. With this assurance, bids were taken again. This time one local and seven outside contractors bid. And the lowest offer was made by an outside contractor, whose bid was \$800,000 less than the previous low bid. While no collusion was proven in this case, it serves to illustrate the necessity for, and the benefits of, PWA's alertness.

LOBBYING

In the summer of 1938, with a large new program under way, PWA received inquiries from a number of California cities asking whether it was advisable to employ a certain man who had promised to see that their projects were allotted, provided he received a percentage of any allotments obtained from PWA. They were immediately advised not to employ the man and an investigation into his activities was instituted. It was found that he based his claims to "an inside track" with PWA on the fact that he had once been employed by the organization. The investigation resulted in recission of allotments for projects in several cities¹ which had employed him.

Most of the investigations have involved no violation of criminal statutes but in the some 400 cases, the evidence has been turned over to the Department of Justice for prosecution.

In still another way does PWA guard the public funds. This is through constant audits of project costs—audits so carefully performed that the possibility of the misappropriation of funds or falsification of records has been reduced to an absolute minimum.

Prior to PWA, because of widely fluctuating wage rates, and because honest contractors were at the mercy of those members of the industry with lower standards of business conduct, the construction was about as much of a gamble as it was a business. Today, with fewer variables, the industry has more businesslike methods, methods more and more applied in non-PWA as well as PWA construction. And the public is assured that in PWA projects it gets its money's worth.

¹ Allotments for projects in San Gabriel, South Laguna, Santa Monica, Upland, El Monte, San Marino, and Orange Counties were suspended pending investigation. All were later reinstated with the exception of two allotments for Orange County.

Section Two

WHAT PWA has done to lay a firm basis for pre-planned public works has been in large part incidental to its task of administering an emergency program. Regardless of the inestimable contributions it has made toward reemployment and business recovery, PWA's work is more likely, however, to be judged by the nature and quality of the public works themselves.

These additions to the national wealth have been constructed both by the Federal Government and by State and local governments.

The Federal Government, through 70 different agencies, has built or improved national facilities for conservation, recreation, transportation, military and naval defense, and administration of its business.

The local governments, through partnership with the National Government, have undertaken an unlimited variety of public works to render more adequately the service which citizens expect. With the assistance of PWA funds, they have built or expanded or improved schools, colleges, universities and libraries for better education; hospitals, sanitariums, clinics, and sewerage and water supply systems for better public health; roads, highways, bridges, subways, tunnels, harbors, wharves, and airports for better transportation; and city halls, courthouses, civic centers, jails, and hundreds of other projects for better public service.

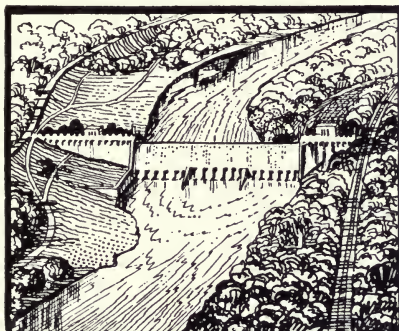
All these are end products of America's first large-scale public works program.



MASONRY WATER TOWER AT BARKSDALE FIELD, LOUISIANA, WHERE PWA FUNDS HAVE BEEN USED FOR EXTENSIVE ARMY HOUSING DEVELOPMENT

Chapter VIII

The Federal Programs



PEOPLE today are prone to overlook the fact that the Federal Government has been building public works since the founding of the Nation. It is the contemporary use of public works as a means of counterbalancing economic depressions and stabilizing business cycles that gives newness to the term. But insofar as building by the Federal Government is concerned, the new role is only "old wine in new bottles."

Ever since the First Congress authorized the taking over of the lighthouses from the States, and a subsequent Congress provided the first public grant of land for a road, the Federal Government has steadfastly pursued a policy of promoting

and fostering, either through direct action or through grants of one sort or another, the construction of public works in the national interest. Navigation aids, military and naval equipment, public buildings, river and harbor improvements, and reclamation have accounted for a substantial portion of the annual Federal expenditures.

Like practically everything else in our Government, public works evolved from a small start. The first appropriation for public works was \$23,000 for light stations and lighthouses. That was in 1791. Later, as the Atlantic seaboard developed, expenditures for defense and trade purposes during the early part of the nineteenth century reached into the millions. When the country beyond the Appalachians opened up, requiring the aid of the Government in the improvement of transportation facilities for internal commerce, further expenditures for public works were made. By 1837, the Federal construction budget was \$4,226,000, and of this amount \$1,362,000 was spent for river and harbor improvements.

Public works, even in those early days, were advocated by the country's leaders as a means to increase the national wealth and further the interests of the individual citizens.¹

As the country grew with surging tides of immigration and people looked toward the West for settlement, the Government sought to open up and develop more and more of the hinterland. It made grants of public lands for education, canals, highways, and railroads.

The first day of the twentieth century found the United States with a population of almost 76 millions and 45 States admitted to the Union. In 1904, under Theodore Roosevelt, the construction of the Panama Canal was undertaken. The President had emphasized the need for reclaiming western lands, and in 1902 Congress passed the reclamation act. This marked the beginning of the Federal Government's

¹ See report of Albert Gallatin, Secretary of the Treasury, on Roads and Canals, April 4, 1808, in which he stated: "Although some of those first improvements should not become immediately productive, and although the same liberal policy, which dictated the measure, would consider them less as objects of revenue to Government than of increased wealth and general convenience to the Nation, yet they would all sooner or later acquire as productive property, their par value."

sponsorship of reclamation by irrigation. The act created a revolving fund by setting aside and appropriating funds received from the sale and disposal of public lands in 16 western States.

GRANTS-IN-AID FOR HIGHWAYS

A new policy of financing public works came in 1916 when the Government supplied funds for highways which would be owned and controlled by State governments upon completion. Although a highway is a local project, the sum total of roads make up major arteries for the Nation's commerce and for the national defense. In 1916 the truck and automobile were emerging as carriers of importance. It was necessary to create some unified system of national highways. And with this program the Federal Government, its available and useful public lands practically exhausted, set up the present system of cash grants-in-aid on a matching of funds basis.

Through the 1920's the public demanded more Federal services. Scientific farming required experiment stations; commercial aviation required airways. Conservation and added leisure time called for new forests, parks to be added to the resources of the Nation. By 1932 the expenditures for Federal public works had risen to almost a half billion dollars.²

But this amount had no appreciable effect on the total of public construction because the States, cities, and other local governmental units abandoned nearly all new construction when the depression struck. In 1925, all public construction amounted to \$2,141,000,000, of which 9.6 percent was Federal. In 1933 Federal construction had more than doubled but the total of all public construction had dropped to \$1,763,000,000.

ADVANCE PLANNING

In 1931, the advice of men who had long pleaded that the Government do something toward the scientific planning of permanent works over a period of years began to be heeded. Congress passed the Federal Employment Stabilization Act. This law provided for the advance planning and regulated

² The highest annual amount up to that time except for the World War years.

construction of public works by the Federal Government and for aiding in the prevention of unemployment during periods of depression. The stabilization board was also to encourage advance planning on the part of the States, cities, and other public and private agencies.

The act proposed planning public works so as to assist in stabilizing employment through the proper timing of construction. For this purpose, each construction agency of the Federal Government was directed to prepare a 6-year advance plan, with estimates for each year. The board set about cooperating with the various agencies of the Government in collecting a program of construction to cover the ensuing 6 years.

When PWA was created, the immediate problem was the distribution of funds to put men to work where jobs were most needed. So, naturally, the new agency turned to the stabilization board with its 6-year program, which, while the legislation was pending, revised and supplemented its lists.

This planning enabled the PWA to begin the recovery movement with a minimum of delay. It made possible the letting of contracts on millions of dollars' worth of construction promptly after the President signed the bill. In the meantime, the States, cities, and other local governments were preparing themselves for the non-Federal program. Altogether, PWA has allotted \$1,768,668,097 for the construction of 17,831 Federal projects to 70 Federal agencies.

FEDERAL COOPERATION

In the building of these projects, PWA made no attempt to take over the construction functions of the various agencies involved. Federal agencies were well-equipped to design and superintend their own work. PWA in cooperation with the Bureau of the Budget acted as a clearing house to see that the various programs were kept in step and that the individual projects comprising these programs were properly selected and coordinated.

Allotments were made under the first program with the advice of a subcommittee of the special board for public works. The Bureau of the Budget cooperated in order to

keep allotments in line with budgetary policy and procedure.

In selecting the projects, they were separated into categories, placing in the preferential group those which were considered "highly desirable public works, not adding to future expense."

The replacement of necessary facilities that were obsolete and would soon require replacement under normal procedure, and the reconditioning of existing facilities to put them in first-class condition, were considered to be desirable projects. The objective was to accomplish that which would have had to be done under normal conditions within the next few years, with the consequent result that necessary expenditures for such projects in future years by regular congressional appropriations would be reduced.

Projects were scrutinized to determine whether they would entail recurring expense for operation, maintenance, and increased personnel. Such projects which in the future would place an unjustified burden on taxpayers were eliminated.

Since preferred projects might have fallen within a comparatively small group of States in which the necessity for emergency employment was not so pressing, geographical distribution was considered.

All applications were subjected to careful examination. The same standards were also applied in making allotments from the \$400,000,000 appropriation contained in the Emergency Appropriation Act of 1935.

Subsequent to the NIRA appropriations and the appropriations contained in the Emergency Appropriation Act of 1935, no funds were made available for the construction of Federal projects until the enactment of the Work Relief and Public Works Appropriation Act of 1938, which set aside \$200,000,000 for useful Federal projects which would increase employment. Here, advance planning, carried on by PWA, again made a list of projects readily available, and within 4 days after the act became law, allotments totaling \$154,740,000 were made. Within 60 days contracts were let, or Government forces put to work, on projects costing more than \$152,000,000.

TABLE A.—Allotments for Federal projects under the N. I. R. A. and P. W. A. A. 1938 programs, as of March 1, 1939

Department and bureau	Streets and highways		Utilities		Educational buildings		Public health buildings		All other buildings		Flood control, water-power reclamation	
	Number of projects	Allotments	Number of projects	Allotments	Number of projects	Allotments	Number of projects	Allotments	Number of projects	Allotments	Number of projects	Allotments
Agriculture-----	224	\$429,979,439	44	\$765,952					483	\$6,325,210	115	\$14,359,824
Forest Service-----	109	24,699,914										
Public Roads-----	9,316	405,012,964										
All other bureaus-----	49	266,561	44	765,952					483	6,325,210	115	14,359,824
Commerce-----	3	36,972	40	428,046					104	1,339,955	1	3,322
Coast and Geodetic Survey-----												
Lighthouses-----	2	36,508	36	405,905					55	85,203		
All other bureaus-----	1	464	4	22,141					33	1,113,450		
Interior-----	469	31,309,503	347	17,379,647	175	\$10,633,688	68	\$6,143,432	16	141,302	1	3,322
Geological Survey-----	1	100							529	12,170,136	176	135,023,095
Indian Affairs-----	131	4,053,700	117	3,297,550	116	7,017,143	50	4,577,758	21	51,557		
National Park Service-----	296	25,895,471	219	2,594,385	9	494,729	4	37,264	153	3,709,965	111	11,284,560
Reclamation-----									307	6,249,935		
All other bureaus-----	41	1,360,232	11	11,487,712	50	3,121,816	14	1,528,410	1	20,000	57	123,229,500
Justice-----	1	24,897	1	90,000					47	2,138,679	1	100,000
Prisons-----									66	14,770,306		
All other bureaus-----	1	24,897	1	90,000			1	1,150	53	14,603,479		
Labor: All other bureaus-----	1	7,254	2	8,366					13	166,827		
Navy-----	9	152,999	90	8,355,395	12	4,275,000	10	3,646,867	40	830,988		
Navy vessels-----									175	21,317,514		
Yards and Docks-----												
All other bureaus-----	9	152,999	21	2,262,000	12	4,275,000	10	3,646,867	175	21,317,514		
Post Office: Departmental-----												
									1	6,198		

TABLE A.—*Allotments for Federal projects under the N. I. R. A. and P. W. A. A. 1938 program, as of March 1, 1939—Continued*

Department and bureau	Water-navigation aids		Vessels		Engineering structures		Aviation		Miscellaneous		Total	
	Num-ber of projects	Allotments	Num-ber of projects	Allotments	Num-ber of projects	Allotments	Num-ber of projects	Allotments	Num-ber of projects	Allotments	Num-ber of projects	Allotments
Agriculture.....	36	\$149,984	17	\$206,837	8	\$21,531			471	\$27,647,982	1,398	\$479,456,759
Forest Service.....									45	15,967,745	154	40,667,659
Public Roads.....											9,316	405,012,964
All other bureaus.....	36	149,984	17	206,837	8	21,531			426	11,680,237	1,178	33,776,136
Commerce.....	235	4,271,027	70	4,800,655	12	305,040	118	\$3,052,493	491	11,452,468	1,074	25,689,978
Coast and Geodetic Survey.....			10	1,648,010					278	8,603,499	343	10,336,712
Lighthouses.....	235	4,271,027	51	3,060,606	12	305,040			10	135,473	379	9,328,009
All other bureaus.....			9	92,039			118	3,052,493	203	2,713,496	352	6,025,257
Interior.....	167	1,662,601			24	672,418	17	116,287	566	25,161,376	2,538	240,272,183
Geological Survey.....	163	1,636,370							270	8,005,637	455	9,693,664
Indian Affairs.....	1	2,000			1	28,500			32	1,643,124	712	35,614,300
National Park Service.....	3	24,231			22	391,328	1	6,400	199	9,939,058	1,067	46,041,836
Reclamation.....									19	1,039,500	77	124,289,000
All other bureaus.....					1	252,590	16	109,887	46	4,534,057	227	24,633,383
Justice.....												
Prisons.....											69	14,886,353
All other bureaus.....											56	14,719,526
Labor: All other bureaus.....	1	503,305	1	2,635	2	57,724					13	166,827
Navy.....	6	3,629,610	61	238,802,727	40	11,886,033	96	13,923,080	110	4,445,543	157	5,855,815
Navy Vessels.....			60	238,702,727					179	8,212,971	678	314,202,196
Yards and Docks.....			1	100,000								
All other bureaus.....	6	3,629,610	1	100,000	40	11,886,033	39	5,400,000	12	2,151,000	60	238,702,727
Post Office Department.....							57	8,523,080	167	6,061,971	292	54,821,023
											1	6,198

FEDERAL AND NON-FEDERAL WORKS

The Federal projects differed from the non-Federal principally in two respects: First, they were constructed by Federal agencies; and second, they were financed solely out of Federal funds. They differed not at all from the standpoint of social desirability. The projects did just as much to raise the standard of living and provide as much employment per dollar, as local projects. Agricultural experiment stations which develop new and better farming methods have a wide influence, just as the building of roads by the Government helps everyone.

Because of the obvious desirability of roads, and because there was a long-standing comprehensive plan for improving our national highway system, the NIRA act itself made a statutory allocation of PWA funds to roads,³ most of them built by the States and administered by the Bureau of Public Roads in accordance with past procedure. But additional allocations for roads were made directly to Federal agencies, like the National Park Service, which is building the 483-mile Blue Ridge Parkway stretching along the Appalachians from Shenandoah National Park in Virginia to the Great Smoky National Park in Tennessee and North Carolina.

This parkway is a good example of cooperation between various Federal and State agencies with PWA funds. The direct cost of the highway was paid by a PWA allotment to

³ See ch. XIV.

TWO VIEWS OF THE ALL-AMERICAN CANAL BUILT BY THE BUREAU OF RECLAMATION TO INCREASE IRRIGATION IN THE IMPERIAL AND COACHELLA VALLEYS IN CALIFORNIA. THE CANAL CARRIES COLORADO RIVER WATER 80 MILES ACROSS THE STATE. UPPER PHOTO SHOWS SECTION OF CANAL RUNNING THROUGH ARID LANDS WHERE IT IS CROSSED BY 4 BRIDGES AT ARAZ JUNCTION IN CALIFORNIA, 6 MILES WEST OF YUMA, ARIZ. THE BRIDGES ARE A DRAINAGE BRIDGE TO PROTECT THE CANAL FROM DAMAGE BY INFREQUENT BUT SEVERE STORMS; U. S. HIGHWAY NO. 80 BRIDGE AND BRIDGES OF THE SOUTHERN PACIFIC RAILROAD AND THE INTER-CALIFORNIA RAILROAD. LOWER PHOTO SHOWS A CLOSE-UP OF TWO OF THE BRIDGES PRIOR TO THE TIME WHEN WATER WAS TURNED INTO THE CANAL



the State highway departments for connections, making the parkway and the parks accessible to the public.

Many other Government agencies, with roads under their jurisdiction in bad shape due to lack of maintenance funds, turned to PWA for help. Recovery funds helped the Office of Indian Affairs, The Alaska Road Commission, the General Land Office, and the Forest Service to bring their road systems up to date.

In the same way, hundreds of other PWA Federal allotments the National Park Service. The Bureau of Public Roads have integrated the development of the widespread building activities of the Government.

BUILDING CONSTRUCTION

In 1933 many of the properties of the Federal Government were in poor shape. In a number of cities, post offices were in disrepair, Federal justice was being dispensed in buildings with sagging floors and leaky roofs, and in scattered courthouses along our far-flung borders, customs men in some instances had to work in poorly heated and equipped buildings. Federal prisons failed to live up to the standards set by the Government's own penologists. There was a shortage of post offices, prisons, veterans' hospitals, and other facilities. In the San Francisco mint, a billion and a half dollars of the Nation's assets were insecurely stored behind ordinary wooden household doors.

Taking as a criterion, whether the projects were necessary for the protection of life, to sustain the physical property of the Government, or to replace obsolete facilities, PWA recommended hundreds of building projects to the President for allotment. The result was 3,174 building construction projects costing \$303,795,615. Post offices ⁴ are perhaps the most typical and most commonly used of these building projects, but a few other types of buildings financed with PWA funds are widely known. Among these is the United States Gold Depository at Fort Knox, Ky.

⁴ Allotments of \$43,607,814 were made for a total of 406 post offices.

The \$560,000 two-story basement and attic building is of granite, steel, and concrete based upon a 10-foot mat of concrete. Its exterior dimensions are 105 by 121 feet and the height is 42 feet above the first floor level. Within the building is a two-level steel and concrete vault, 40 by 60 feet, for the storing of gold. The vault door weighs more than 20 tons. Roofs to the vault as well as the depository are bombproof. The structure was virtually completed in 1936, and the first gold was moved in by railroad in January 1937.

NATIONAL DEFENSE

National defense is a major function of the Federal Government and of course many PWA allotments were made for this purpose. There are new fighting ships like the U. S. S. *Vincennes*, aircraft carriers like the U. S. S. *Enterprise*, cruisers, destroyers, submarines, airplanes, and ordnance for the Navy. There are new barracks for the Army, new flying fields for the air arms of both services. One of the greatest of these projects is the expansion and development of Scott Field in Illinois to provide the new home for the GHQ air force, a more strategic location than the old headquarters at Langley, Va. In order to provide accommodations for the vastly expanded activities, a PWA allotment of \$4,403,400 will provide new runways, aprons, night lighting,

ONE OF THE HIGH SPEED WIND TUNNELS AT LANGLEY FIELD, VA. THIS TUNNEL IS USED BY THE NATIONAL ADVISORY COMMITTEE ON AERONAUTICS FOR TESTING LARGE SCALE MODELS AND FULL-SIZE AIRPLANE PARTS AT AIR SPEEDS FROM 85 TO MORE THAN 500 MILES PER HOUR. THE RESULTS OF THE TESTS MADE IN THIS TUNNEL ARE APPLIED TO THE DESIGN OF MODERN HIGH SPEED AIRPLANES



hangars, warehouses, and gas and oil storage tanks for the field; officers' quarters, barracks, administration building, guard house and hospital, for the personnel; as well as numerous other buildings. The total for all these national defense projects amounted to \$824,670,870.

Coupled with national defense and yet of great help to the aircraft industry and to air safety were the allotments made to the National Advisory Committee for Aeronautics for the three wind tunnels at Langley Field, Va. Making possible experiments on a scale hitherto impossible in this country, each of these tunnels serves a different purpose. One takes complete, moderate-sized airplanes. Another, probing into the performance of tomorrow's airplane, tests models in wind speeds up to 500 miles an hour. A third, looking still further ahead, develops speeds as high as 750 miles an hour. These wind tunnels have already been of inestimable value to aviation both civil and military, and the research that has gone on has shown the need of even greater facilities along this line.

The wind tunnels are just one example of the research activities made possible by PWA funds in depression years. In PWA-financed buildings, scientists of the Biological Survey of the Department of Agriculture, the Soil Conservation Service, and the Bureau of Mines, are exploring the frontiers of science with the latest technical facilities, working for methods and products that will lead to a better use of our resources. Meanwhile, scientists of the Coast and Geodetic Survey aboard the survey ship *Explorer*, built with PWA funds, are searching and mapping the frontiers of the ocean. And PWA funds have provided for mapping of hitherto uncharted sections of our own country, indicating new resources in minerals, oil, and timber.

HOUSING AND INDIANS

In a totally different field, PWA explored a new frontier in public works in this country. The NIRA Act provided for a program of low-cost slum clearance housing. Local communities lacked facilities and authority to embark on

the program at once so the Administrator created the PWA Housing Division, which built 51 projects at a cost of \$136,-669,759, providing low-rent homes for 70,000 to 80,000 people. (See ch. XVI.) ⁵

The Federal Government through PWA took care of its responsibility toward its Indian wards. The Government has a definite responsibility to provide for housing, education, health, administration, and conservation for the American Indian. PWA provided \$7,017,143 for educational buildings, \$4,577,758 for health, \$1,685,117 for shelters and living quarters, \$1,060,000 for a new capital for the Navajo tribes, and more than \$4,000,000 for new roads and bridges. A great deal of conservation work was carried out by the Office of Indian Affairs. Neglected for long periods, Indian lands had suffered from deterioration through overgrazing; \$11,284,560 provided for conservation projects for rehabilitating this land. These projects on the reservations, like most throughout the West, provided for soil conservation, flood control, and irrigation. They will make for greater self-sufficiency on the part of the tribes.

CONSERVATION OF RESOURCES

PWA has enabled the Government to expand the work of conserving all our natural resources. The largest part of the work has been through flood control, water power, and reclamation projects, to which PWA has contributed more than \$262,535,655, in addition to the work of building forest roads and trails to open timberlands, to fight fires, and for recreation.

One of the primary purposes of these projects is the preservation of life and property from floods, in such projects as the Muskingum Valley undertaking in Ohio, where the building of 14 dams has given security and opportunities for better economic life to an area comprising a fifth of the State and in which live 675,000 people.⁶

⁵ PWA also made allotments to the Subsistence Homesteads Division of the Department of the Interior for construction of rural-urban self-help communities. This division was later transferred to Farm Security Administration, Department of Agriculture.

⁶ See ch. XVIII.

Floods on the Mississippi River, like those on its tributaries, have brought disaster to the lower valley at frequent intervals. Crops, transportation facilities, homes, industrial plants, and other property have been destroyed. To help control the waters of the Mississippi River, the Mississippi River Commission was set up in 1879, and since that date, especially in recent years, much work has been carried on by the United States Army Corps of Engineers. PWA has provided funds to assist in the construction of dams and locks, levees, and other control work.

THE ARID AND SEMIARID WEST

While the eastern United States frequently has been hit by floods, vast areas in the West have remained just as dry as they were when the Forty-niners died of thirst on their long trek toward gold. Yet flying over the arid and semiarid West today the air passenger sees verdant regions amid the deserts. One of the largest of these gardens in the desert is the million acres of cantaloupes and lettuce, alfalfa, and small fruits watered by the All-American Canal. A PWA initial allotment of \$9,000,000 began construction of 80 miles of main canal from the Colorado River to the Imperial Valley and the 130-mile branch to the Coachella Valley. From these valleys for years to come fresh cargoes of fruits and vegetables are expected to be grown for the dinner tables of the Nation, crops that do not compete with established farming areas already in use but rather give Mrs. America new variety for her winter table. PWA has made allotments of \$123,229,500 for 57 irrigation projects throughout the West.

But many of these irrigation projects, like the All-American Canal are not for irrigation only. The All-American Canal is a part of the huge Boulder Dam conservation development.

From its discovery in 1540, until it was harnessed by Boulder Dam, four centuries later, the Colorado River was one of America's most dangerous streams. Like other western streams this giant fluctuated through a cycle from a roaring flood-swollen torrent when snows were melting, to

a sandy bottomed sluggish creek during the long dry summers and autumns.

Man's crying need for water caused him to turn early and calculatingly upon the Colorado. Farmers, tempted by dry fertile soil in the Imperial Valley, tapped the river for irrigation water. But the river taking vengeance sent floods, created the Salton Sea. On the other hand in summer it frequently faded to a trickle.

A great demand arose for the control and conservation of this river whose waters were the most valuable resource of a vast desert empire. Following a compact between the seven States affected, Congress passed the Boulder Canyon Appropriation Act in 1930, for construction to begin the following year. Completion was to take 8 years. PWA entered the picture in 1934 with an allotment of \$38,000,000 which speeded up the work and enabled the project to be completed over 2 years ahead of schedule.

MULTI-PURPOSE PROJECTS

Many PWA Federal allotments enabled projects which were scheduled to take years to complete, to be speeded up so that the major stimulation of employment and orders to industry would come in depression years. In the case of Boulder Dam, not only did the revenues earned by this project begin to come in 2 years sooner, but the early completion is estimated to have saved millions of dollars in property and perhaps many lives. In 1934, the Southwest suffered a severe drought. The levees which protected the rich lands adjoining the lower river cracked and weakened. In May 1935, the river began to rise in flood. With levees weakened, this foretold disaster on the lower reaches.

But PWA funds pushing the work ahead of schedule, enabled the huge control gates to be closed in 1935, and Boulder Dam held back the water, releasing it as needed during the following months.

Boulder Dam does many things in the field of water conservation. It provides a steady and trustworthy water

supply for the All-American Canal, for the Imperial, Yuma, and other valleys. Through a 250-mile aqueduct connected to a diversion dam lower downstream, it provides domestic water for Los Angeles, Long Beach, and 13 other cities. Floods that raged with destructive force against the communities far downstream are halted, and the water saved for use. Lake Meade, created by Boulder Dam, provides a new recreation area in a district formerly shunned. The lake assumes new importance as a haven for wild fowl and fish, where none existed before. And the lake provides 115 miles of new navigable waterways above Boulder Dam, and improves navigation in the lower river.

Each of the great multi-purpose conservation projects has a different major function. A PWA grant of \$2,125,000 enabled the Bureau of Reclamation to build Caballo Dam, making the irrigation water stored by Elephant Butte Dam available for power. The Kanawha Dam built primarily for navigation provides flood control in West Virginia, and will ultimately be developed for power also. The Ogden, Utah, project is primarily designed to widen an area already under irrigation.

As a rule, PWA has not financed new reclamation projects. In most cases, as in Ogden, the money has been used to aid lands already reclaimed but endangered by too scant water for the demands of a growing population.

It is generally overlooked that most of these great undertakings are revenue projects. As soon as they are completed, revenues from the sale of irrigation water, and from the sale of the irrigated land begin to flow in. The \$38,500,000 cost of the All-American Canal will pay for itself over a period of 40 years.

And much of the cost of these projects will be repaid by the sale of the great corollary product of water—electric power. Boulder Dam itself will furnish 1,835,000 constant electric horsepower. From the sale of power, Boulder will repay its investment with interest. Millions of horsepower are being produced and sold at other projects. This means income for these projects—and cheap power for the public.

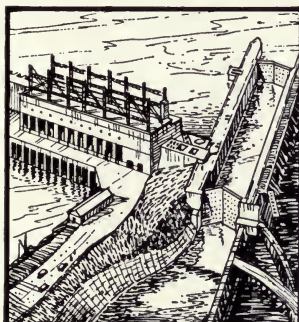


ELECTRIC POWER EQUIPMENT AT NORTH PLATTE, NEBR., PART OF THE
GREAT NEBRASKA POWER PROJECTS

A M E R I C A B U I L D S

Chapter IX

Electric Power



SOMEONE presses a button and electricity makes the breakfast toast, lights streets and homes, turns factory wheels, pumps water to thirsty farm lands, and performs a myriad of other tasks.

In a short space of years electric power has become an essential of everyday life, relied upon by industrial, domestic, and agricultural consumers. A cheap supply of power has become as indispensable to farm, factory, and home as a cheap supply of water, a factor to be reckoned with in the problem of making a living and in living itself. It is also one of the basic elements of national defense.

Yet, full use of this willing servant long has been denied large areas of the country and large numbers of its citizens.

Lack of adequate supplies of power or the unavailability of existing service has deprived many people of its benefits. Often where electrical energy was available in limited amounts the cost was prohibitive. But it can be plentiful, and it can be cheap.

At Cascade Locks, Wash., for \$1 a month a housewife can obtain 40 kilowatt-hours of electricity, enough to light an average home, and operate a radio, a toaster, a vacuum cleaner, washing machine, and iron.

For \$2.25 a month, she can obtain 100 kilowatt-hours, or enough to provide for electric refrigeration also. For a total of \$4.75, she can add the convenience of an electric stove, and another \$1.50 will bring her these conveniences, and in addition a plentiful supply of hot water.

If she uses as much as 500 kilowatt-hours of electricity a month, this Cascade Locks housewife would pay an average rate of 1¼ cents for each kilowatt-hour.

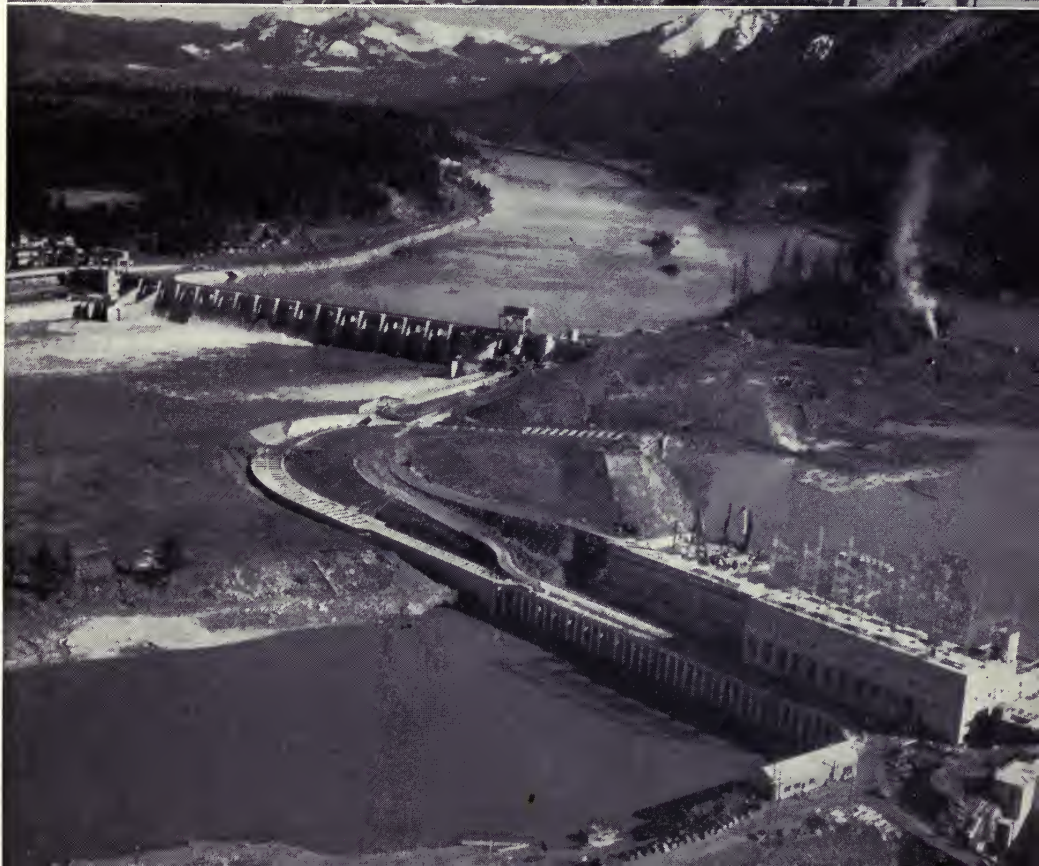
Living in Cascade Locks, she gets her electricity from a municipal distribution system which, in turn, buys power at wholesale from the great Bonneville Dam nearby.

Under the rates charged at Cascade Locks before Bonneville power became available the housewife paid \$2.80 for the same amount of electricity which now costs her \$1. And she paid \$11.60 a month instead of \$6.75 for 500 kilowatt-hours, and similarly higher amounts beyond.

Cascade Locks was the first community to buy power from Bonneville Dam, built across the Columbia River at a cost of \$75,000,000, of which PWA furnished \$42,950,000. Now Bonneville's well-known "objective rate" is available to thousands of other customers of municipally owned power systems and cooperatives serving rural areas of the Pacific Northwest.

Bonneville is providing abundant and cheap power. And at the same time it, and similar developments financed in part by PWA, have effected other far-reaching benefits. Bonneville, for example, extended an inland seaway 188 miles from the Pacific to bring low-cost transportation to a wide territory.

BONNEVILLE DAM (LOWER PHOTO) AND GRAND COULEE DAM (UPPER PHOTO), GIGANTIC PROJECTS ON THE COLUMBIA RIVER IN WASHINGTON AND OREGON, UNDER CONSTRUCTION. THESE PROJECTS, WHEN FULLY COMPLETED, WILL PROVIDE CHEAP ELECTRIC POWER AND IRRIGATION IN THE COLUMBIA BASIN AREA IN THE NORTHWEST, AS WELL AS PERMIT NAVIGATION ON THE RIVER



BONNEVILLE AND GRAND COULEE

Bonneville and Grand Coulee which has been called "the biggest thing on earth," will make cheap power available throughout the Northwest. PWA furnished the initial funds, \$14,000,000, which started construction of Grand Coulee, located approximately 235 miles northeast from Bonneville on the Columbia River. Both projects are investments, eventually self-liquidating. Bonneville is scheduled to pay off in 40 years with interest at 3½ percent all that portion of its cost allocated to power production.

While providing power, Grand Coulee will store enough water to irrigate 1,200,000 acres of rich desert and farming land. And on those irrigated acres, homes will be provided for between 25,000 and 40,000 families, with as many more in towns located in the area. These two major steps in the Columbia Basin development should bring rich returns in the way of increased production of profitable crops, added land values, cheap, energy-saving power for every need, and low-cost transportation to the markets of the world.

These, then, are multiple-purpose projects, serving more than one function in the public interest. In the past, dams were frequently designed for a single purpose. A power dam, for example, was a power dam and nothing more. Now it is recognized that a dam may be so planned as to have many uses.

All in all, in providing \$253,016,000 for use by the Bureau of Reclamation and the Army Corps of Engineers, PWA has made possible the building of dams which will reduce floods, provide irrigation for desert acres, create a source of water supply for cities, make possible many miles of safe waterways, and provide vast new recreational areas, while bringing the benefits of low-cost power to millions of people.

These Federal projects (although several of them are not yet complete) already have an installed hydroelectric capacity of 3,852,500 kilowatts—enough to supply electricity to 10,000,000 additional average residential consumers.

The output of these plants, in some instances, is being sold

to consumers in whole or in part through private companies. Bonneville power is sold at the same wholesale rate to municipalities and private companies. Power produced by the waters of the Colorado at Boulder Dam reaches the consumer through both public and private channels.

NON-FEDERAL HYDRO PROJECTS

Works on the lower Colorado River, in Texas, reduce floods as well as produce power. For years that river, one of the Nation's most temperamental streams, had subjected the area to its periodic rampages. Ordinarily the lower Colorado flows, mild and harmless as a meadow brook, past Austin and through the plains below. Then suddenly it rises, striking at crops and settlements, doing an estimated annual property damage of \$4,000,000. Between floods, the river is often too low. Droughts as well as floods have taken their toll from the people who live along its banks. Although there are about 600,000 acres in the valley suitable for rice culture, water for less than one-tenth of that area has been available. The Colorado River of Texas has also been a poor source of drinking water for the communities through which it flows. The problem on this river, as on many others, is to conserve wasteful flood waters and make them available when and where they are needed. To tame this river and to conserve its waters, the Texas Legislature created the Lower Colorado River Authority to construct a series of dams which will reduce the floods and which will pay for themselves by the production of power, and the sale of water for irrigation. To aid in the construction of these dams and for transmission lines to carry power at low cost to more than a score of cities and rural cooperatives, PWA made allotments totaling \$33,600,000.

In Oklahoma, \$20,000,000 was allotted for Grand River Dam which was designed to provide both flood reduction and power. In South Carolina \$34,300,000 was allotted for Santee Cooper project, to provide both an abundance of cheap power and a navigable waterway from Columbia to the sea. As the Colorado River water flows along the All-American Canal

irrigating the Imperial Valley in Southern California, it also produces electrical energy to run machines and to conserve human energy.

In Nebraska, PWA-financed construction has made possible the production of power for widespread urban and rural uses, while conserving flood waters of the Platte and Loup Rivers for thousands of acres of rich farm lands, and reducing floods. PWA made loans of \$38,900,000 and grants of \$24,174,000 for works in Nebraska's three big public power and irrigation districts and in two districts selling power and using water for irrigation.

Altogether 32 non-Federal hydroelectric projects,¹ many of them including flood reduction features and provisions for irrigation and municipal water supply have been financed with PWA assistance. These have a total installed capacity of 536,242 kilowatts—enough to serve more than a million American homes.

¹ See table 7 in appendix for list of Federal and non-Federal conservation projects which include hydroelectric features. Also see map preceding.



PUBLICLY OWNED POWER STATION IN NEW JERSEY, WHICH HAS UNDERGONE EXTENSIVE REMODELING AND IMPROVEMENT WITH PWA ASSISTANCE

STEAM AND DIESEL PLANTS

Where hydrodevelopment was neither possible nor feasible, many communities wanting cheap electric power for their citizens sought to build steam or Diesel plants. High rates charged by some privately owned power companies frequently was the reason advanced for seeking PWA assistance in building municipal power facilities. These communities had found that cheap power is a basic factor in their growth and well-being. PWA considered these applications on the same basis as those for any other type of permanent and useful project. Objections were registered and various propaganda campaigns were launched by utility interests to force PWA to discriminate against public power project applications, but the agency refused to discriminate. PWA allotted \$22,871,-864 for the construction and improvement of 212 steam and Diesel plants. Allotments also were made for 33 gas plants and gas-system additions, both for natural and manufactured gas. These cost \$3,401,296.

Culpeper, Va., which in 1934 completed the first municipal electric facility to be built with PWA funds, provides an example of PWA's assistance in the non-Federal power field. With fewer than 2,500 residents, that city increased revenues from power 6 percent although rates were reduced during the period. In 1937 the city made more than \$24,000 over and above operating and investment retirement expense, with rates which were about 10 percent lower than those charged by a private utility before the municipal plant went into operation.

In Hoisington, Kans., although the municipal plant went into operation in August of 1938, an addition was under way less than 6 months later because the number of customers had increased from 750 to 1,050. Estimated billings for the plant's first year of operation were \$55,000, sufficient to pay expenses and retire outstanding indebtedness in a little more than 5 years.

Danville, Va., which has owned its electric system longer than any community in the United States, completed a

PWA project designed to bring its system up to date. Power produced by two dams on the Dan River is brought to the city by a high tension transmission line.

ELECTRIC DISTRIBUTION

In areas where large hydroplants have been constructed, many communities have sought to handle the distribution of power by themselves, either by buying existing facilities owned by private utilities or by constructing their own lines. Numerous applications for allotments for the construction of distribution systems in areas near large power developments have been received by PWA.

In the TVA area, especially in Tennessee, Mississippi, and Alabama, communities sought funds to enable them to use the power generated at the TVA dams. The city of Memphis started constructing, as a PWA project, the largest distribution system ever built at one time, to serve its quarter of a million residents. First, however, it tried to persuade the local power company to sell the existing facilities. It was not until construction was well along that the company agreed to sell. This made it unnecessary for the city to build a complete distribution system, and allowed it to extend and improve its facilities to serve the greatly increased load resulting from lower rates.

In the lower Colorado River area so many cities voted to install their own distribution systems to use power generated by the Authority that the private company decided to sell all its properties in 16 counties to the Authority. This company, too, desires to purchase a portion of the Authority's power for sale in other sections.

The interest of communities in public power systems is, of course, not confined to the areas where public projects are making available a supply of cheap wholesale power. A great many cities owning or building their own power plants have sought PWA aid for financing new distribution systems or improving existing ones. Since 1933, some 750 applications for funds have been received from cities wishing to build distribution systems which would compete with existing

systems privately owned. Of these, 80 received allotments.

Municipalities have received, all together, a total of \$205,075,300 in loans and grants from PWA for the construction of new plants or improvements to their own power plants, transmission and distribution systems, and facilities of all types. The total estimated cost of all these 340 non-Federal projects amounts to \$263,000,000.²

PWA POWER POLICY

Despite the fact that State laws allow cities and other agencies of the State to issue bonds and construct public works of a competitive nature, and although in the case of the *Alabama Power Company vs. Ickes, et al.*³ the courts cleared the way for PWA allotments to such competitive projects, PWA has made every effort to prevent a wasteful duplication of facilities for which the consumer, in the end, would have to pay.

Under current policy, a city wishing to build its own electric distribution system with the help of PWA funds, must first make a fair and reasonable offer to purchase the existing competing facilities. Only if this offer is not accepted by the private utility will PWA make funds available to the city. As a result of this policy, during 1938 and to date, a number of cities arranged to purchase privately owned systems valued at more than 25 million dollars, exclusive of the recent negotiations concluded between the Commonwealth & Southern Corporation and the Tennessee Valley Authority.

Municipalities borrowing PWA funds must charge rates high enough to liquidate bonds and maintain their facilities. As a rule they charge to their power plants a sum equivalent to the taxes which would ordinarily be paid by a well-run, properly capitalized, private utility. Nevertheless, many communities have found their electric power operations to be a means of preserving the standard of living through lower rates to the consumers. Moreover, lower rates are creating

² See table 8 in the appendix. These totals do not include 33 gas projects costing \$3,401,296, for which PWA made loans totaling \$1,227,000 and grants totaling \$1,141,670.

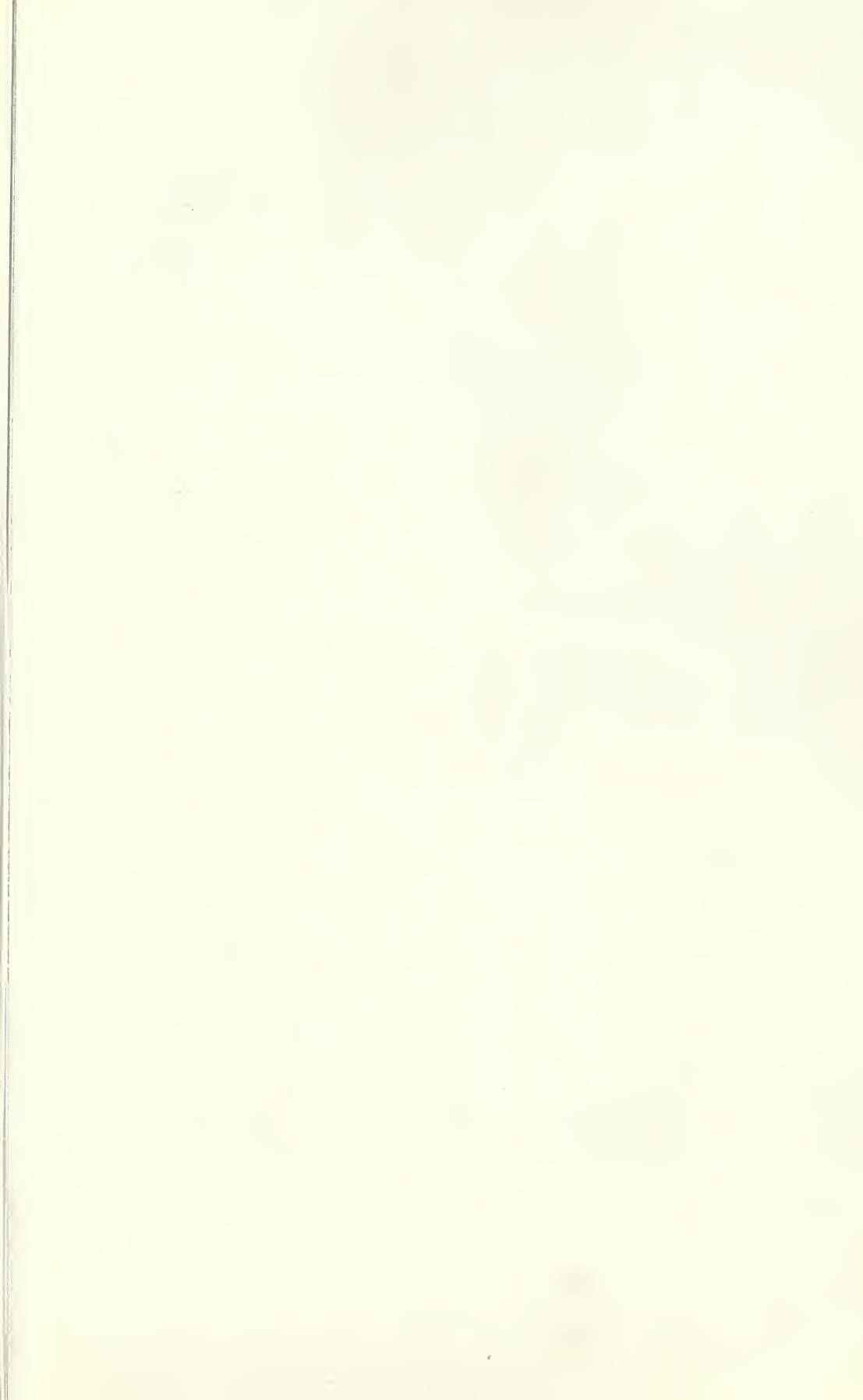
³ See Ch. IV.

new demands for appliances, carrying domestic consumption of electric energy to new highs.

Holland, Mich., which is now increasing its power plant capacity with a PWA allotment, has been operating its municipal electric system for some 30 years. It charges low rates for the power produced and furnishes a good example of how domestic electric energy demand may grow. The average kilowatt-hour consumption per residential customer rose, under the influence of lowered rates, from 896 in 1934 to 1,325 in 1937. The consumption of the average industrial customer rose in the same period from 15,550 kilowatt-hours to 28,600. Because it cost less, customers used more and the over-all average revenue per customer including industrial and municipal uses went up from \$47.60 in 1934 to \$63.30 in 1937 while the average rate per kilowatt-hour dropped from 3.1 to 2.7 cents. In Holland, as in hundreds of other communities, low rates are making electricity more widely used than ever before.

The Nation's electric power resources have grown steadily both through private and public enterprises. But the end—the saturation point—is far in the distance. There are still millions of rural homes without an available source of electricity. There are new industries still forming and established industries are moving to regions where cheap electric power is available.

While public power projects have created a great deal of controversy, it must be remembered that PWA's attitude toward such projects has not differed from its policy with regard to all other types of projects. PWA has always considered the need and social desirability of these projects and applied to them the same criteria as it has toward other classes of public construction. They were studied from the standpoint of legal, engineering, and financial soundness, and in total they comprised a small percentage of all PWA projects, as contrasted with allotments for public health and particularly educational facilities.





BUILT TO WITHSTAND EARTHQUAKES, THIS MODERN SCHOOL IN SOUTHERN CALIFORNIA IS ONE OF HUNDREDS BUILT OR IMPROVED IN THE LOS ANGELES AREA

Chapter X

For Better Education



WHEN the public-school bells ring, 30 million youthful Americans respond. This army of young people—more than one-fifth of the Nation—receive their education in structures ranging from little, antiquated one-room schoolhouses to huge, complex buildings containing auditoriums, gymnasiums, laboratories, shops, and cafeterias as well as classrooms.

A few years ago America faced an acute shortage of school facilities. Since two out of every five schools in the country had been built before the turn of the century, a large number of the buildings were obsolescent. Many of these were unsafe, unsanitary, and dangerously susceptible to fire. Others, in addition, failed to provide for recreation, vocational education,

and other needs of the modern curriculum. Moreover, many buildings were overcrowded because enrollment had increased by leaps and bounds during the preceding decades, particularly in the high schools, where the number of students rose by 178 percent in the span of a generation.

PWA has aided materially in efforts to overcome this acute shortage of adequate school facilities. Since 1933 PWA has made allotments for 7,282 educational building projects costing \$1,161,118,000.¹ These comprised over 40 percent of all the non-Federal projects for which PWA made allotments, indicating to some extent what the communities of the Nation have considered to be their prime need in the matter of public works.

Communities in every State of the Union, and in the Territories and possessions, participated in this program of educational building construction. The total number of projects in some States reached into the hundreds, while in no State were there fewer than a score. All in all, PWA accounted for more than 70 percent of all school construction carried on since 1933, adding about 60,000 classrooms with seats for approximately 2,500,000 pupils.

In general, PWA allotments for school construction have served four main purposes: (1) To provide new facilities to meet the needs of shifting populations and growing enrollments; (2) to replace unsafe and obsolete small buildings with modern, consolidated schools; (3) to provide new structures with modern equipment to replace obsolete and overcrowded buildings without proper heating, ventilation, lighting, or sanitation; and (4) to provide needed additions and improvements to existing buildings.

NEW SCHOOLS BUILT

Largely due to the Federal Government's willingness to share the cost of local public works in order to put men to work, a number of communities which had no school facili-

¹The sponsors of these school projects contributed \$588,068,908 of the total cost and PWA the balance of \$573,048,936, of which \$93,789,369 represents interest-bearing loans repayable to the Government.

A MODERN SCHOOL



ties whatever for large groups of their children, undertook to build schools.

Tucked away up in northern Vermont, plumb against the Canadian border, sprawling across half a dozen islands and peninsulas of Lake Champlain is the town of Alburg in Grand Isle County. It is a hard country, but farming (and frog catching), milking the cows, and work in the railroad yards supports Alburg's 1,600 people and the 4,000 in the county.

With the tradition of free education for all, the Vermonters of Alburg have provided primary schools for generations. But the rocky Vermont soil (plus the water barriers of the lake) made a high school too much of a financial burden for them to start.

Parents who wanted their children to get the advantages of a high-school education were faced with two discouraging alternatives. They could bundle the youngsters up long before the cold winter dawn, take them to the railroad yards and put them aboard a train to be taken across the lake to Rouse's Point in New York State where there was a high school. The returning train brought the children home after 8 o'clock at night. A 12-hour day for education!

The second alternative was to let the children walk the railroad trestle across Lake Champlain. In blustery winter weather, this was no pleasant adventure.

After years of discussion, the community leaders got together and found a solution. With the aid of a PWA grant of \$28,000 they were able to build a \$63,000 high school. It is not a large or ornate building, but it is the first high school in Grand Isle County.

Alburg is not an isolated example. At the other end of the country, in Palm Springs, Calif., a new PWA high school was constructed to save the children a daily bus trip of 50 miles to the nearest school in Banning.

There are many other instances of PWA aid in bringing schools where none existed before, but far more typical is the work done to bring modern, consolidated schools in place of one-room structures.

CONSOLIDATED SCHOOLS

The little red schoolhouse, like McGuffey's Reader, is the product of a bygone era. Yet, while the reader has disappeared, except as a collector's item, the little red schoolhouse is present in many localities. There are 142,000 of them out of a total of approximately 246,000 schools. In these little structures, a single teacher most often teaches children of all ages and all grades, and these children must prepare themselves under such handicaps for the future. Despite the appearance of economy, educators point out, the little one-room schools are expensive anachronisms, for it may cost less to do a better job in a centralized modern school.

Lyme, Conn., was one of the first communities to seek PWA assistance in bringing its school facilities up to current times. Lyme is an old town. In 1789, at the time a little band of revolutionaries under George Washington had succeeded in setting up a new Nation, Lyme built a one-room schoolhouse. The town added four more one-room structures by 1847. That completed the school program. They were good schools by the standards of those times. However, they lacked

toilets, ventilation, and proper lighting. Heat was provided by cast-iron stoves.

As the years passed, Lyme changed from an agricultural-fishing village to a unit in New England's industrial set-up—a stop on the Boston Post Road, over which rumbles the major traffic from New York to the Northeast.

Long before 1933, everyone was ready to admit that Lyme had gotten its money's worth out of its century-old schools. Something better was needed for the children. But it was not until PWA was set up that the school districts could get together with hope of a new building. An application to PWA brought them an outright grant of \$8,400 for a \$32,732 modern school plant. They built themselves a trim one-story field stone and concrete structure with four classrooms, an auditorium, and domestic-science and manual-training facilities. The building, adapted to local architectural style, accommodates 160 pupils, a few more than the five one-room buildings it replaced.

Lyme offers a typical example of what PWA has been doing to help in the movement toward consolidation. In a number of instances, PWA has cooperated with State education authorities and planning boards, as well, toward this end. In Virginia, for example, progressive educators have urged consolidation for a good many years, and in this they were encouraged by the State planning board. Applications received by PWA from individual school districts were referred to the State department of education and the planning board, and as a result consolidations were effected. In Charlotte County, a new modern school replaced six existing schoolhouses.

By providing assistance for the construction of 791 consolidated schools throughout the Nation, PWA eliminated 1,582 obsolete structures. But PWA assistance, in actual operation, consisted of more than loans and grants of money. Legal experts helped to simplify the process of forming new school districts and financial experts helped develop new methods of borrowing funds and marketing bonds. Moreover, the movement has been given impetus by the construc-

tion of new and improved PWA-financed roads and highways on which school buses ² can travel.

The types of schools needed most vary as shifts in population and age groups take place, and new methods of education develop. America has a declining birth rate, and the elementary-school population has been decreasing for several years. But more parents want their children to have the advantages of a high-school education. High-school population has more than doubled since 1920, and is still growing at the rate of 300,000 pupils a year. Moreover, the tendency toward urbanization has added to the problem of overcrowded schools.

When PWA arrived on the scene, there were 2,700,000 pupils going to school in temporary shelters. Hundreds of thousands of others were attending on the platoon system, one set arriving very early in the morning and rushing through their lessons by noontime to make way for a later shift. In some extreme cases two and three pupils had to share a single desk.

MODERNIZATION

To overcome this deficiency and also to provide facilities for modern education, such as laboratories, shops, and auditoriums, communities participating with PWA in the public works program not only built new schools, but also built additions and made improvements to existing structures.

It has been estimated that PWA projects have added to the educational plant of the Nation 4,300 auditoriums, 3,500 gymnasiums, 1,800 libraries, 1,350 shops, 890 cafeterias, and approximately 12,000 other units including laboratories, study halls, and science and commercial classrooms.

Wherever existing buildings could be utilized, and thereby save expense, PWA projects provided merely for improvements. In Philadelphia, Pa., for example, the board of public education received a PWA allotment for alterations

² PWA also made various allotments for school buses. In Beckham County, Okla., for example, an allotment was made for the purchase of 3 buses to pick up the farmers' children and carry them to a well-equipped school. The State of North Carolina received a grant of \$197,000 to provide more than 750 buses (costing \$655,000) for the school children.



A NEW CONSOLIDATED SCHOOL IN GLOUCESTER, R. I., WHICH HAS REPLACED FIVE ONE-ROOM SCHOOLS AS SHOWN IN THE INSET

and additions necessary for installation of modern lighting equipment in 175 of the city's schools.

School officials generally have felt that in order to provide reeducation for adults, and training for young people between the ages of 18 and 21 who are neither at college nor at work, as well as for young persons who will have to make a living in business and industry, schools should contain facilities for technical training. Typewriting, bricklaying, farming, engineering, and machine operations cannot be learned from books. Special facilities are needed. Therefore, such facilities have been quite common among PWA projects.

Perhaps one of the best illustrations of specialized facilities is in the Industrial High School at Columbus, Ga. All day long this two-story building is jam-packed with youngsters and oldsters learning the textile trades. There are picking rooms, spinning rooms, weaving rooms, dyeing rooms, electrical shops, auto shops, manual-training shops, domestic-science rooms, in fact all the facilities that young men and women need to fit themselves for a place in local industry. This building was designed for the needs of Columbus,

which is a textile town. In many other cities, industrial schools specialize in crafts utilized in the particular community, or provide general vocational training. Also in hundreds of general high schools built with PWA funds there are shops provided on a smaller scale for those students who desire a specialized type of training.³

There is an interesting result of this new equipment and better physical facilities for education. A school in Genesee County, N. Y., built over 55 years ago, was staggering under a load of 180 pupils. The PWA application called for a new building to accommodate 300. Embodying agricultural shops, laboratories, and industrial training, the new school was completed in December 1936. When it opened its doors for the next school term 300 pupils enrolled. New educational facilities had persuaded many students to go on with their education. In addition several neighboring communities subsequently closed their schools and sent the children to the new school, bringing the total enrollment close to 400, again creating an overcrowded condition. Centralization of school districts was carried out in the area, and the consolidated school district undertook with PWA aid to build two additions to the new school building to take care of an expected enrollment of 600.⁴

The demand for more and better education continues beyond the elementary and high schools into colleges and universities. As a result, many cities have improved their facilities for higher education, and the young men and women seeking a better place in life have turned in increasing numbers to the new opportunities. In Brooklyn, PWA helped build a complete new college costing \$5,900,000. It was dedicated by President Roosevelt, and shortly after the ceremonies, 11,000 students were using it.

³ PWA has also allotted funds for handicapped children in many cities. For example, a grant of \$98,214 enabled Indianapolis to build the \$218,000 James E. Roberts school for crippled children. This two-story building has ramps and elevators in addition to stairs. Extra wide corridors lead to the usual classrooms, and to the special physiotherapy rooms. These contain special booths, a large hydrotherapy tank built up from the floor, sitz baths, rhythm and exercise rooms, and on the roof is a sun deck for heliotherapy.

⁴ The centralized school district also undertook with PWA aid the construction of a new school a few miles away.

Most land-grant colleges and State universities, long-established, have sought PWA help for modernizing science, mechanical, and technical facilities, and for housing students and faculties. The University of Alabama is characteristic of what a university has done with PWA help. Thirteen separate projects costing \$2,566,655, with an outright PWA grant of \$1,153,365, have provided a new science building and several dormitories for men and for women.

At Virginia Polytechnic Institute in Blacksburg, Va., a widely diversified group of buildings were made possible by an allotment of \$2,069,338. These structures included two dormitories; administration and utilities buildings; four buildings of classrooms; and improvements to waterworks, heating plant, and sewerage facilities.

In all, PWA has made allotments to 662 college projects, with a total construction cost of \$198,164,000. Out of 69 land-grant colleges, PWA helped build new facilities on all but 8 of them.



TRAINING FOR INDUSTRY. A TECHNICAL CLASS IN A READING, PA., HIGH SCHOOL, LEARNING HOW TO HANDLE MACHINERY

It is interesting that many colleges are financing their 55 percent of the cost of dormitory projects by revenue bonds based on the rents charged for rooms. They are self-liquidating revenue projects.

ADULT EDUCATION

Of course, adult education is not confined to colleges. Most new schools are built to provide for service also to adults seeking further chances to learn in the evenings, and they are being used for that purpose.

And rounding out the educational facilities, PWA has approved applications for 105 libraries, to provide reservoirs of knowledge for all to use. In many cases private memorial funds had been left to the cities. These funds were, in most cases, insufficient to construct a building and consequently remained unused until PWA grants made up the necessary amount to go ahead with construction in depression years. The beautiful Rundel Memorial Library in Rochester, N. Y., was built in this way.

FEDERAL INSTITUTIONS

In addition to giving assistance to local communities for schools, PWA made allotments for Federal projects. Uncle Sam's service training schools at West Point and Annapolis have been refurbished with PWA funds. The Military Academy received allotments of \$3,483,464 for 20 projects which included new barracks, officers' quarters, a gymnasium, nurses' quarters, warehouses, stables, and shops. At the Naval Academy, 36 PWA allotments totaling \$5,324,057 provided new radio equipment, hospital facilities, a chapel extension, officers' quarters, and repairs to a number of services such as the power and heating plant, the mess hall, roads, and in cooperation with the civil authorities provided for a new sewage disposal plant. The famed snow white uniforms of the cadets will be kept clean in a new laundry.

On the western reservations the Government has built schools on the Federal lands reserved for the Indians. In 6 years, PWA allotted \$6,141,000 for 90 projects on 45 reser-

vations. These included elementary and high schools, dormitories, and laboratories. In the same way, PWA allotments have materially helped in Alaska and the Canal Zone, and have provided new buildings and equipment for Howard University at Washington, D. C.

Non-Federal, as well as Federal, applications have reflected the Nation's growing concern over unsafe and unsanitary buildings and equipment. The President and the Administrator have determined that these cases should receive every consideration. A typical engineer's report graphically shows conditions at Kanawha City, W. Va., at the time they made application for PWA funds:

A cheap building poorly constructed. Walls are out of plumb. Many families refuse to send their children to this school. Site is a swamp. Insanitary toilets in basement that is flooded several times during the year. Drinking facilities limited. Very poor lighting facilities. Some rooms are so arranged that windows are on the right of pupils seated. The new building will permit the establishment of an adequate junior and grade school organization in this community.

SAFETY FACTORS

Every day, every year, five schools burn. To eliminate schools that are a daily threat to children's lives, PWA, in providing funds for their replacement, required that every new school, built with PWA funds, shall have sufficient resistance to fire so that every child has plenty of time to leave the building. This meant no dead-end corridors to trap youngsters, and plenty of exits. Sixty percent of new school buildings completed with PWA funds before 1939 replaced fire hazardous buildings.

Leading engineers throughout the country developed a new type of earthquake-proof schools for Los Angeles which should protect school children from disasters similar to the one that occurred in 1935 (see ch. XVIII).

In assisting local school authorities, PWA has helped set new high standards of construction and safety in the educational fields. One very important point must be remembered in this connection. While PWA has made no attempt to

dictate to the local school boards what kind of a building they should build, nor to control the curriculum, it has insisted that the best common practices of the building and safety codes should be met.

STANDARDS OF CONSTRUCTION

The results of this effort are shown in a survey by the Office of Education which queried school superintendents who had experience with both buildings constructed with PWA help, and buildings without assistance from PWA. Answers were received from 817 school superintendents.

These superintendents were asked, Were the school building standards for the PWA school buildings as compared with other buildings higher, about the same, or lower?

Of the superintendents: 47.4 percent replied that they were higher, 47.2 percent said they were about the same, 2.7 percent found that they were lower, and 2.7 percent gave no reply. A further break-down of this figure showed, as might be expected, that PWA high standards were of more help to rural schools than to those in large cities. Of the rural school superintendents 53.7 percent found PWA standards higher. In the larger cities, the school systems generally had complete staffs specializing in school construction. Yet 32.9 percent of these cities volunteered that PWA standards were higher, and 61.1 percent found them about the same.

The second question inquired whether construction of school buildings under PWA regulations was better, about the same, or poorer. Of the superintendents 48 percent answered that it was better, 44.7 percent said it was about the same, 4.4 percent said it was poorer, and 2.9 percent did not reply.

The next question asked, Were plans and specifications for school buildings more complete, about the same, or less complete? Of the superintendents, 48.1 percent answered more complete, 46.4 percent said about the same, 2.9 percent thought they were less complete, and 2.6 percent made no reply.

The fourth question inquired if fairness in competition for

PWA contracts was fairer, about the same, or not so fair. Of the superintendents, 22.4 percent thought it was fairer, 70 percent replied it was about the same, 4.2 percent said it was not so fair, and 3.4 percent made no reply.

The last question asked if accounting methods developed under the PWA were better, the same, or poorer? Of the superintendents, 59.2 percent said they were better, 33.8 percent said they were the same, 2.9 percent replied that they were poorer, and 4.1 percent did not answer.

Useful as PWA loans and grants have been, much as PWA has done to raise the standards, school building construction has nowhere near been restored to predepression levels, which in turn was not enough to make up for the lag in school construction during the war.



THE MEDICAL AND DENTAL COLLEGES LABORATORIES BUILDING OF THE
UNIVERSITY OF ILLINOIS, LOCATED IN THE HEART OF THE WEST SIDE
MEDICAL CENTER IN CHICAGO

Chapter XI

Aids to Health



ALMOST a million people stay in bed each day—not because they are lazy, or because they enjoy it, but because they are sick in hospitals. On an average day, 4 million more Americans are ill enough to stay away from schools or their jobs, or other activities. While most of these have minor ailments such as colds, many of them are disabled seriously enough to require hospitalization or clinical treatment. But only a small percentage can receive such care, for the simple reason that there is not enough space in public hospitals to provide for them.

There are only 1,100,000 beds at present to provide for all kinds of patients—general, tuberculosis, mental, and other

special cases. America needs a third more beds. The United States Public Health Service estimates that the country needs 400,000 additional hospital beds to meet minimum professional standards of adequate care.

PUBLIC HEALTH NEEDS

The shocking shortage of health facilities in the United States has been called to public attention many times by medical welfare and health groups. In July 1938 the President called a National Health Conference,¹ at which the whole grim picture was dramatically presented. A technical committee, composed of medical experts, reported after a Nationwide health survey that the health of thousands upon thousands of Americans was in jeopardy through lack of pure drinking water and sanitary sewage systems; that millions of people have no ready access to clinics, hospitals, and other modern facilities for treatment of illness; and that thousands die every month of disease that medical science can cure. Medical science has made magnificent strides, but it is of no help if it cannot be made available to the people.

America is still behind the times, medical experts state, so far as adequate health care of its citizens is concerned. The depression, with its concurrent malnutrition, poorer housing, and lower living standards threw an unprecedented load on the hospitals. At a mental hospital in the Middle West, each new truckload of patients meant that an equal number would be allowed to "walk away" to make room. At a great metropolitan hospital in the East, patients had to be placed in corridors of the service buildings. This was not callousness; it was the result of the tremendous pressure for space.

In a Southern State, an iron cage on a truck toured the State picking up mental patients, carting them to a central wooden hospital. So great was the need for space that there

¹ Sponsored by the President's Inter-Departmental Committee to Coordinate Health and Welfare Activities. This committee appointed a technical committee to make a survey of the Nation's health needs, and proposed a national health program. See Proceedings of the National Health Conference, Govt. Printing Office, 1938.



CHARITY HOSPITAL, NEW ORLEANS, THE LARGEST MEDICAL INSTITUTION
IN THE SOUTH, WHICH HAS REPLACED THE OLD HOSPITAL SHOWN IN THE
INSET

could be no room between the beds. If two patients got into trouble in the far end of the room, the nurses had to remove their shoes and skip over the bodies of the intervening patients to tend their charges.

The technical committee found that 40 percent of the counties in the United States were without a registered general hospital. They found that 60 percent of the States had fewer hospitals than could be considered adequate. The need for public hospitals was most urgent, since the private hospitals, with expensive rooms, were out of reach of the majority of citizens. The committee found that either because of the location of existing hospitals, or because the patients were unable to purchase the services, general hospital care was not available to a large part of the population.

The committee also estimated that normal increase in hospital beds should be 25,000 a year. PWA has provided 121,760 beds in hospitals costing \$367,659,880. Therefore,

PWA has provided the equivalent of 5 years' normal growth.

PWA, however, has not enabled the Nation to catch up with the growing demand for hospitals, although it has provided 35 percent ² of the total increase in hospital facilities from 1933 to 1939—during a time when the need for new facilities was most urgent. PWA has helped those who could least afford hospital facilities by providing for publicly, or Government-owned hospitals. With PWA funds the Federal Government has provided new facilities for the growing load of sick veterans and for men in active service, as well as vastly increasing medical research stations. Encouraged by PWA funds, thousands of communities have taken up the burden of constructing hospitals to catch up with their local needs.

PWA-financed non-Federal hospitals can be classified into three or four major types of hospitals—general hospitals, those specializing in mental cases, tuberculosis cases, and homes for the aged and indigent.³

GENERAL HOSPITALS

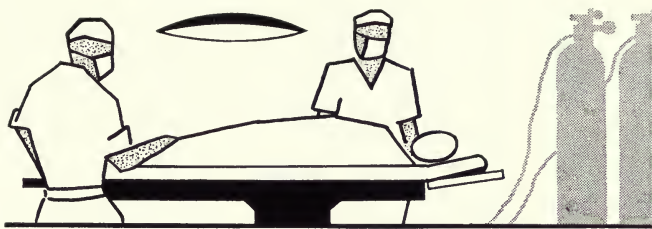
In the South, as in some other regions, the deficiency of general hospitals has been acute. At New Orleans, PWA has helped build one of the largest institutions, the Charity Hospital, sponsored by the State of Louisiana. Costing \$13,000,000, it will be one of the greatest hospital plants in the world, with a capacity for 3,000 patients.

This 22-story cream-colored limestone building has been designed with the latest and best improvements in equipment. Its dozens of operating rooms will not only be air conditioned, but will be the first to be equipped with explosion-proof operating lights, designed to prevent recurrence of the disasters in which the intense heat of the light, or an accidental spark set off highly explosive anesthetic gas. In its X-ray and theurapeutic clinics, the myriad ills of man will

² Expenditures on PWA hospital projects as compared to total expenditures for hospital construction during the same period.

³ A summary of non-Federal hospital projects classified by type is given in table 12 in the appendix.

PWA AIDS HOSPITALS



TYPE

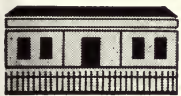
NUMBER OF BEDS



GENERAL



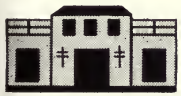
21,923



MENTAL



59,891



TUBERCULOSIS



17,340



CHARITABLE



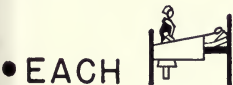
10,014



FEDERAL



12,584



• EACH REPRESENTS 10,000 BEDS

receive the best treatment available. In addition, like most good hospitals, Charity Hospital will be an educational institution for completing the training of medical students. Students from Tulane and Louisiana State University will observe operations and autopsies performed, and make the rounds with famous surgeons. Included in the project are the numerous facilities that must go with a great hospital plant. There is a nurses' home as large as many big city hotels. A utilities plant will provide heat, light, and power, making the healing center independent of interruptions in vital services, likely to occur when the load is greatest, such as at flood times.

Charity Hospital is a State institution, providing free care for citizens living in the southern half of the State. This is a starting point in helping patients over a large area. But there was, and there still is, a great need for small but modern general hospitals in rural areas all through the country. The hundreds of general hospitals built with PWA funds have provided many of these.

Availability of these small general hospitals will mean the saving of many lives in childbirth and surgery cases, and with the tragic growth of automobile accidents, the ready accessibility of such hospitals for emergency cases may mean the difference between life and death.

PWA has also helped in such urban hospitals as the General Hospital in Boston, where a PWA grant added 300 beds to the capacity. And the same story can be told time and again by merely varying the location to Dallas, to Pittsburgh, to Baltimore, to Miami, and to scores of other communities. In some cases complete new hospitals have been built and, in others, vital additions and improvements have been made.

MENTAL HOSPITALS

However, the majority of public hospital beds in the United States are occupied by nervous or mental patients. In 1937 there were over 400,000 such patients. And each year the Nation must plan on caring for 11,500 patients more than the year before. This does not necessarily mean

that the United States is getting crazier every year. It is partly the result of the breaking up of the family unit which used to keep its ill members at home, and partly the result of decreasing financial ability of people to care for their own dependents. Because of the long period of treatment for mental patients, the task of caring for them has been a problem for the State and local governments.⁴

In line with the general averages, more than 50 percent of the PWA hospital allotments have been made for construction of hospital facilities for nervous and mental patients. In the non-Federal program alone, 49,725 beds have been added for the treatment of mental illnesses, 8,304 more for the care and treatment of the feeble-minded, and an additional 1,870 for epileptics.

There have never been enough beds to take care of mental patients. Since PWA started, impressive strides have been made. A few States such as Connecticut, New York, New Jersey, North Carolina, and Arkansas have almost caught up with their needs. Most States have not.

In Arkansas the Census Bureau found in 1934 that there were twice as many inmates in asylums as could be properly cared for. One of the earliest applications PWA received was for a project that would add buildings at the State asylum near Little Rock. Arkansas is now in the front rank of States which are meeting the demands made for care of the mentally ill.

Rhode Island is another State that could not meet the demands for mental care until PWA granted an allotment which helped finance \$6,000,000 in additions to the asylum at Howard and the institution for feeble-minded at Lafayette. In 1934 institutions built for a capacity of 1,550 inmates, staggered with a load of 2,232. The PWA allotment provided accommodations for 2,620 patients. Today Rhode Island has facilities adequate to meet its burden.

At Moose Lake in Minnesota a PWA allotment enabled the State to build a complete new \$2,181,500 unit in the

⁴ The technical committee reports that 96 percent of beds in all mental hospitals are operated by State and local governments.

State asylum system. On 1,700 acres in Carlton County there have gone up a new administration building, men's receiving hospital, women's receiving hospital, auditorium, gymnasium, service building, women's dormitory, men's dormitory, nurses' home, doctors' home, male employees' dormitory, two residences, power plant, garage and shop building, freight depot, dairy barn, horse barn, chicken house, piggery, and three cottages for farmers. This project includes landscaping, roads, and equipment for buildings and for the farm.

Many of the mental hospitals are built in the midst of farms as the Moose Lake plant is. This not only serves to lower the cost of maintenance by having the inmates raise their own fresh foods, but provides a form of occupational therapy for the patients.

Many schools for feeble-minded and epileptic children have been built on the same principle. At Mansfield the State of Connecticut maintains a school, which with the aid of a PWA grant of \$2,576,700 provides living and hospitalization facilities, as well as farm and shop work adapted to the abilities of the patients.

In all, PWA has helped provide more adequate treatment for those in need of mental hygiene and for the care of defective children in 40 out of the 48 States.

TUBERCULOSIS HOSPITALS

Tuberculosis hospitals follow mental and general hospitals in number, on the PWA roster. In the last few years the dreaded "white plague" of our fathers' time has been brought largely under control. PWA has lent aid to the work that has fought this disease to a standstill. The great strides made in the treatment of tuberculosis, the increasing success of the medical profession in halting the ravages of the disease has created a tremendous demand for facilities where modern treatment and research can be carried out. Like mental diseases, advanced cases of tuberculosis require long periods of treatment. For most patients the cost of this treatment



CHILDREN ARE GIVEN SUN-LAMP TREATMENT IN THE ORTHOPEDIC CLINIC,
PART OF THE ILLINOIS STATE RESEARCH AND EDUCATIONAL HOSPITAL IN
CHICAGO

would be prohibitive without assistance from States and counties.

Florida illustrates how acute the lack of facilities for the treatment of tuberculosis has been in some States and how this lack has been met through PWA help. In Florida by 1927 the death toll from tuberculosis had reached a thousand a year. It was estimated then that there were 11,000 known cases of the disease in the State. At the same time in the whole State there were available only 185 beds in publicly owned hospitals for the treatment of the disease.

When the full facts about conditions were made known, the Florida Legislature established a special board to deal with the problem. After an extensive survey, the board recommended the building of five sanatoriums. With little money to meet its problem, the board turned to PWA for aid in constructing the first of the five treatment centers. This sanatorium, built at Orlando, cost \$805,890, of which PWA furnished \$639,890 in loans and grants. The sanatorium houses 400 patients.

In all PWA has provided 22,401 new beds for the care of tuberculosis patients in institutions at a total cost of \$85,972,-

915.⁵ While this is the total number of beds for the checking and cure of advanced cases, due to the improvements in methods of treatment, new techniques in preventive medicine are pointing the way to cutting down on the ravages of tuberculosis while cutting the cost of treatment. The President's committee has recommended the construction of health centers where diseases such as tuberculosis would be diagnosed in incipient stages, before the patient was really sick, and treatment applied in time, would check the disease.

In New York City the program of building health centers on a widespread scale has been carried on with PWA funds. Similar centers are being built in other parts of the Nation. In this connection, many new PWA-financed schools have been equipped with health clinics, where children can be examined periodically and their parents warned of troubles which may later grow serious. Not only will this type of preventive medicine mean much in saving human suffering, but it will mean a dollars-and-cents saving in expensive medical facilities.

HOMES FOR THE AGED

At the other end of the human span are the PWA-financed charitable homes for the aged, for those whose life work is nearly over. On a grassy knoll, overlooking the rugged hills of New York's Westchester County is the county home built with a PWA grant of \$525,000. Here the sun streaming in the great windows finds a solarium on the east and west exposures. Between are compact neat little rooms for single people and some slightly larger for couples. Inside the building is a cheery dining room, a small assembly hall, complete hospital facilities for the infirm, and a tiny chapel, where last rites may be performed for those whose duties to this society are done.

Throughout the Nation, PWA has helped provide 6,614 new beds for the aged in charitable homes costing \$12,604,514.⁶ Most of these homes, like various hospitals, are run

⁵ Of these, 17,340 are in non-Federal projects costing \$67,913,740.

⁶ Of these 5,867 are in non-Federal projects costing \$12,376,054.

in connection with farms, to provide fresh foods and to lower costs.

FEDERAL HOSPITALS

While the majority of the hospital facilities have been built by State and local communities with the aid of Federal grants, PWA funds have provided for 12,584 additional beds in 151 Federal projects at a cost of \$36,887,384. The Veterans' Administration alone has built 43 PWA-financed hospitals, clinics, and homes, providing 7,793 beds. The War Department, Office of Indian Affairs, the Navy Department, the Department of Justice (in connection with prisons), and the Treasury Department have provided the remainder.

OTHER HEALTH FACILITIES

Although all the classifications above, both non-Federal and Federal, show how PWA has provided new hospital beds, this does not cover the field of PWA help to public health, for a great number of applications were for service and utility buildings in connection with existing plants. There were hundreds of projects for rebuilding kitchen facilities, boiler plants, power and light plants, nurses' homes, administration buildings, staff quarters, garages, water-supply systems, and other utilities. These added no beds, but in many cases made additional beds available in the hospital buildings which had formerly been needed for staffs.

There is still another type of medical project which does not provide beds, but is of great importance. PWA has made allotments for construction of medical schools and dental schools, where medical students and graduate doctors will receive more adequate training. Syracuse University has long been a major factor in training doctors for the central New York area. So old and so dilapidated had the school plant grown that it was in danger of losing its Medical Association rating. Being a private institution, it was not eligible for a PWA grant, but PWA made a \$825,000 loan which enabled the authorities to build a modern plant to carry on the work.

The allotments to the State colleges have been of great importance. The University of Indiana had been conducting classes at Bloomington in a medical building constructed for a capacity of 30 students in 1884. Remodeling and new equipment in 1911 enabled it to serve 60 students, but it was far too small for the 120 who were crowded in. A PWA grant helped build a beautiful new three-story stone and concrete school of medicine, costing \$469,650. The University also has a medical center in Indianapolis. Because of the need for space, PWA helped finance a \$637,983 medical and clinic building, whose five floors contain examination rooms, laboratories, offices, wards, and private rooms. It is virtually a hospital, and will furnish added instruction to advanced students.

The University of Illinois had been training its medical and dental students in a ramshackle old building in the midst of Chicago's growing West Side medical center. For many years increasing enrollment and new research activities were badly hampered by lack of space. Finally, a PWA loan and grant provided the University with a 15-story laboratory building for the medical and dental colleges.

Medical buildings and clinics, dispensaries, and research centers have also been built as educational projects for such universities as the Universities of Arkansas, Georgia, Kansas, Louisville, and Maryland.

An important phase of medical care has been the provision of out-patient departments, dispensaries, and serum centers. Manhattan's famed old Willard Parker Laboratory, long a major source of serums for the prevention of virulent disease, had grown so old and unsanitary that it was condemned. This meant that the hundreds of health departments throughout the Nation that depended on it for certain serums which could not be commercially supplied, would be left without the life-saving capsules. In response to this need, PWA made a \$700,000 allotment to rebuild the plant and carry on the vital work.

SPECIAL HOSPITALS

Even among the specialized hospitals built with PWA

funds, the hospital at Rolla, Mo., is unique. The State board of health applied to PWA for a grant of \$61,000 to build a new hospital for the treatment of trachoma, a virulently contagious disease of the eye, making great inroads in the region. The State legislature appropriated \$75,000, and the citizens of Rolla provided a site. The new hospital contains 60 beds, and the most up-to-date equipment known for the treatment of trachoma.

Throughout the Nation there have been more than 4,393 of these miscellaneous medical projects, costing \$17,519,491. Each of them really deserves a chapter in itself. The most that can be said is that all stand ready to render service to the Nation.

REMAINING NEEDS

All PWA projects are socially useful but there are few types of projects more so than the hospitals which its funds have made possible. The United States is still under hospitalized, but without PWA's help during the last few years it would have been faced with a more tragic inadequacy of modern facilities.

Despite the more than 121,000 beds added to the Nation's hospital resources through PWA during the last 6 years there is yet much to do. To bring the country's hospital facilities to an adequate standard the technical committee prescribed 36,000 beds a year and the establishment of some 500 health and diagnostic centers in areas now inaccessible to hospitals.

Trying to cure a disease after it has wrought havoc in the body is necessary, but it is far more intelligent to prevent disease in the first place. What use is it to build hospitals and clinics just to fill them with cases of water-borne disease from an unsanitary water supply? What use is it to build a fine water distribution system that takes its water from a river polluted by the discharge of raw sewage from the next town upstream? Each of these types of facilities is an outpost in the chain of fortresses needed to protect our health.



AN INTERIOR VIEW OF THE NEW SEWAGE-TREATMENT PLANT AT PERTH AMBOY, N. J. THIS PROJECT IS ONE OF 16 CONSTRUCTED OR IMPROVED WITH PWA AID BY NEW JERSEY COMMUNITIES IN ORDER TO ABATE POLLUTION IN THE RARITAN RIVER

A M E R I C A B U I L D S

Chapter XII

Sewage and Stream Pollution



NO SELF-RESPECTING fish would enter the mouths of many American rivers. If it did, it would face a terrific struggle for survival among the sewage, floating cabbage leaves, tin cans, orange peels, garbage, street refuse, industrial wastes, and other debris that competed with it for the available oxygen.

The silvery frost fish, a delicacy for which fishermen have spent many happy hours angling, used to abound in the Raritan River, in densely populated northeastern New Jersey. But that was almost two decades ago, when the waters of the stream were relatively pure, and men as well as fish swam in it. As late as 1922, Rutgers University, which

graces the river's banks, held an Olympic tryout there.

Five years later, however, that would have been impossible. The intense industrialization of the area which began during the war years, and the increase in population to 250,000 people in that 1,100-square-mile drainage area, brought about a befouling of the waters that menaced public health, caused a drop in real-estate values along its shores, and seriously threatened the rich shellfish areas of Raritan Bay. Out of the 16 municipalities that dumped sewage into the stream, 10 had no treatment works, 5 others had old and inadequate works, and 1 had a plant which could be made to operate efficiently with minor improvements.

The pollution finally became so unbearable that the State department of health ordered 11 of the municipalities to cease discharging untreated sewage into the river. The courts held the department to be right. The communities said they had no money to correct the situation. And so nothing was done.

PWA, as soon as it was organized, became interested in the situation. Beginning with an allotment of \$920,000 to Perth Amboy for the construction of that city's sewage-disposal system, financial aid was rendered by 1938 for all 16¹ communities for works costing \$4,212,000. Now, the Raritan rapidly is becoming the beautiful stream it once was, and anglers report the return of the silvery frost fish.

WASTES CREATE LOSSES

Sports, recreation, health, transportation, real property, and other economic assets all suffer from stream pollution. Wastes are no respecters of city limits or State lines. Only a few years ago, the sewage from Buffalo polluted the Niagara River used by other cities lower down as their source of drinking water, culminating in an outbreak of thousands of cases of illness. For many years the dumping of New York City sewage, refuse, and garbage fouled the Jersey seacoast causing physical nuisance, and greatly reducing real-estate

¹ Perth Amboy, Highland Park. Metuchen, New Brunswick, Keyport, Manville, Plainfield, Bound Brook, South River, Sayreville, Raritan, Raritan Township, Flemington, Somerville, Middlesex, and Woodbridge.

values. Many extensive areas in Pennsylvania and other mining States bear mute witness to the ravages caused by mine wastes, with a gray pall blotting out all signs of vegetation. Towns in Iowa, Wisconsin, Illinois, and practically every other populous State maintained the stand-by, obnoxious dump ground.

An indication of the economic losses of uncontrolled waste disposal is presented in the report ² of the joint survey of the upper Mississippi River made by the State departments of health of Minnesota and Wisconsin. The report showed an annual loss to commercial fishing and clamming of \$95,000; annual damage to sport fishing and attendant industries, \$35,000; damage to lands for recreational use estimated at \$1,500,000; and decreased property value in the Twin Cities approximating \$2,000,000.

For many years it has been a matter of political expediency for American cities to appropriate for good roads, and discharge raw sewage into streams on the theory that good streets bring votes while construction of secluded sewage-treatment plants means bond issues and operating expenses which raise taxes and irritate voters. Too often the communities lower down on a stream have refused to clean up because the cities upstream have neglected their responsibility to the public and industry in the disposal of their wastes. Under this laissez-faire policy, the conditions of the Nation's streams have become worse from year to year. The great wave of intestinal disorders that spread progressively down the Ohio River following the 1930 drought attacking various cities in sequence, and the more recent outbreak of over 100,000 cases of intestinal disturbances in Milwaukee, may forecast more serious disease outbreaks in the future unless pollution loads are limited.

Today ³ the sewage from approximately 25 percent of the urban population of the country receives primary treatment only, while the sewage from 35,000,000 people or 47 percent of the urban population is discharged untreated into water

² First Report on Water Pollution, National Resources Committee.

³ National Resources Committee release No. 66, February 1939.

PERCENTAGE OF URBAN POPULATION HAVING SEWAGE TREATMENT



FULL TREATMENT



PRIMARY TREATMENT



UNTREATED



EACH FIGURE REPRESENTS 10% OF URBAN POPULATION

bodies. About 2,300,000 tons of sulfuric acid are discharged into streams annually from abandoned and active coal mines. According to the United States Corps of Engineers, annual losses from acid pollution in the Pittsburgh district—an area with exceptionally acute waste problems—amounted to at least \$8,000,000 in 1925.

Damages from such disposal of wastes are more serious in the Nation's vital manufacturing belt which extends from the Atlantic seaboard between Boston and Washington westward to Chicago and St. Louis. This is a zone of concentration of population and of industry. Fully 75 percent of the wastes-disposal problem lies within this area and a few outlying areas on the Plains and the Pacific coast.

SURVEY OF FACILITIES

According to an inventory of sewage-disposal facilities in the United States in 1938, no section of the country has more

than 70 percent of its urban population served by sewage-treatment works. The Middle West ranks first in this respect, while the New England area is at the bottom, indicating that "the New England and Southern regions have not advanced their programs for sewage treatment at the same rate that the country as a whole has achieved."⁴

*Percentage of total urban population in the United States,
served by sewage-treatment works, according to regions*

Middle West.....	68.5
West of Mississippi River.....	65.3
Middle Atlantic.....	52.4
Far West.....	48.5
Southern.....	31.4
New England.....	26.0

Effective control of waste disposal heretofore has been hampered principally by (1) a multiplicity of conflicting laws; (2) a multiplicity of State departments, agencies, and municipalities concerned with the administration of stream-pollution laws, often with conflicting aims and interests and no mandatory powers; and (3) constitutional or statutory limitations on the bonding or taxing power of municipalities.

Such were the conditions in 1933 that the problems of stream pollution by industrial waste and domestic sewage were outstripping the best efforts of those whose function it is to effect an economic and regional balance between sensible regulation and industrial expansion.

PWA ALLOTMENTS

PWA early recognized the importance and need of sewerage works and designated their construction as desirable. It made allotments for 1,527 sewage systems costing more than \$466,000,000, representing 11 percent of the estimated cost of all PWA non-Federal work. Sewage-treatment plants alone accounted for 873 projects costing \$325,358,000. About 67 percent of all new sewage-treatment plants constructed since 1933 have been PWA projects.⁵

⁴ Engineering News-Record, Vol. 122, No. 3, January 19, 1939.

⁵ See tables 9 and 10 in the appendix.

In Iowa, furthering a State-supported drive to stop the dumping of raw, untreated sewage into the State's rivers and streams, PWA aided communities in undertaking the construction or improvement of more than half a hundred sewage-disposal plants at a cost of about \$9,280,000.

This construction was the response to efforts to end a condition of pollution the State health department long had considered "very serious," from health and sanitary stand-points.

The fight to free Iowa from the scourge of sewage pollution brought State legislative action in 1924 with a law forbidding cities to dump untreated sewage into rivers and streams. It took further tangible form in State health department "desist" orders in 1931 and 1934, subsequently upheld by the State executive council.

The orders required 14 cities and towns on three of the principal river systems, the Des Moines, Iowa, and Cedar, to show cause why they should not dispose of municipal sewage through treatment plants. Other communities over the State, with less acute conditions, needed treatment plants or additions to existing facilities. Prevented by financial considerations from proceeding with their needed developments, Iowa communities turned to PWA for assistance. PWA grants and funds supplied by the communities themselves made the construction possible.

With the exception of Ottumwa and Marengo, all 14 of the "cited" cities undertook sewage-plant projects. The dumping of untreated sewage into the waterways—amounting to millions of gallons a day—has been curtailed sharply. At Des Moines, for example, one outlet for treated sewage was designed to replace more than half a hundred separate units for untreated city waste.

NEW YORK STATE PROJECTS

Although State laws governing stream pollution in New York date back to 1903 and much effort was expended by the State health department in remedying conditions, it was not until Federal aid was made available that real progress was

achieved. In the period 1934-38 more sewage-treatment plants have been constructed in New York than in the previous 30 years. In this achievement the policy of PWA was not to usurp any of the powers of the State authorities. Instead PWA assisted the State agencies through close cooperation so that in design and construction the projects fulfilled State requirements.

The State department of health of New York has been endeavoring particularly to clean up the Hudson River and New York Harbor, Lake Erie, and the Niagara River. PWA assistance in providing sewage-treatment plants for Buffalo, Niagara Falls, and Tonawanda, and the Coney Island and Ward's Island plants at New York City as well as many plants on the Hudson River, is resulting in the elimination of the pollution of these waters. The pollution load of the Niagara River has been reduced to such an extent already that the need for water-purification chemicals formerly used by the waterworks plants to purify the river water has been reduced considerably. The millions of bathing patrons using the Coney Island beaches annually are being furnished a water free from the former sewage filth and bacteria.

The whole New York Harbor clean-up is an excellent example of interstate cooperation and the use of regional authorities to effect a reduction in pollution of common waters. The Interstate Sanitation Commission, set up in 1930, attempted to carry out a complete program, but until Federal aid made possible the construction of 14 sewage-disposal systems on the Hudson River and in the New York Bay region—an area of 12,000,000 population, progress consisted mainly of extensive planning. In other watersheds throughout the Nation, interstate authorities are also being established to handle common problems of this nature.

PROJECTS IN OHIO

In Ohio, although statutes have been in effect for more than 30 years, real progress in the abatement of stream pollution has been confined to the past 10 or 15 years, and especially

the period since 1933. About 15 years ago a State-wide survey of stream conditions showed that approximately 400 miles of the 12,000 miles of streams in Ohio were badly polluted. Although there were some 60 sewage-treatment works serving municipalities, less than one-half were giving satisfactory results. The failures were due largely to neglect and need for improvements to plants. With PWA aid during the period 1933-37, \$23,000,000, or more than twice the amount spent on sewage-treatment improvements in the 6 years prior to Federal aid, added 1,790,000 people or approximately twice the population contributory to sewage-treatment plants in the prior period.

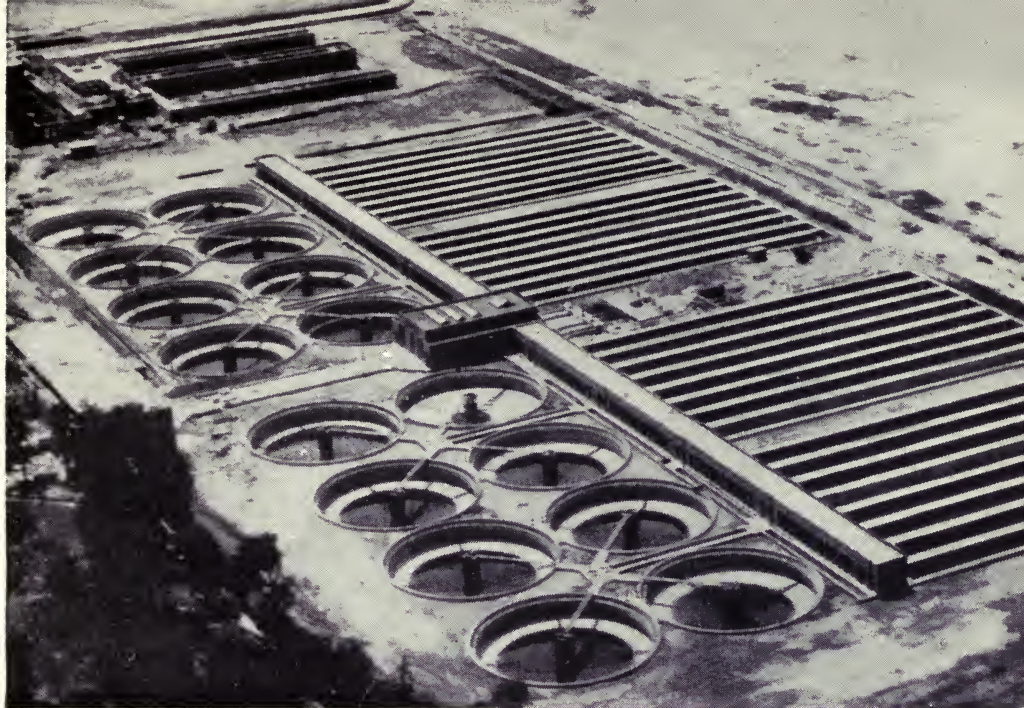
The greatest single sewage-disposal project of its type in history was successfully completed by PWA in Chicago (see ch. XVIII), ending a generation of legal battles in which States bordering on the Great Lakes, and States touching the Mississippi River were involved in the litigation, which was settled by the Supreme Court. The lake States did not want their water drained off to flush Chicago's sewage down the Chicago and Illinois Rivers to the Mississippi, and the river States did not want the city's wastes under any circumstances.

As PWA studied the Nation's sewerage problems, it adopted a policy of refusing to be a party to the construction of any sewerage system which permitted untreated wastes to enter into any lake or stream so as to increase pollution. As a result the construction of many disposal plants was hastened.

The examples of progress achieved in sewage-treatment plant installation in Iowa, New York, Ohio, and Illinois are typical of other States. In a number of instances, there have been comprehensive clean-ups of whole drainage areas, such as the Raritan River valley in New Jersey.

FOX RIVER DRAINAGE BASIN

The Fox River area in Wisconsin may serve as another case in point. The Lower Fox River is a waterway about 38 miles long in northeastern Wisconsin, connecting Lake Winnebago with Green Bay, and has a drainage area above the mouth of the river of about 6,430 square miles. The serious



THE EASTERLY SEWAGE-TREATMENT WORKS, PART OF THE VAST SEWAGE-TREATMENT PROGRAM UNDERTAKEN WITH PWA ASSISTANCE IN CLEVELAND, OHIO

pollution of the Fox River has been under investigation by the State board of health for many years. The population contributing sewage from the adjacent cities is approximately 140,000. The waste from paper mills discharged into the river comprises a large part of the pollution, increasing the quantity of sewage to the equivalent of a population of 800,000. The condition of the stream particularly in the summer has affected the use of the water for bathing and recreational purposes and as a source of water supply by communities.

Sewage-treatment plants have been constructed with the aid of PWA for Oshkosh, Neenah and Menasha, Appleton, Little Chute, Kaukauna, De Pere, and Green Bay, at an estimated total cost of \$5,000,000. With the exception of Neenah and Menasha, which have a joint plant, all the plants provide for primary treatment by plain sedimentation or chemical treatment, and for chlorination of the plant effluent during periods of critical river flow, as approved by the State Board

of Health. These plants have resulted in practically cleaning up the lake and the river.

WASHINGTON METROPOLITAN AREA

Another example of PWA aid in cleaning up a drainage area is that of the Potomac Drainage Basin in the Washington metropolitan area and nearby vicinity. The population of the entire basin in 1932 was estimated at 1,200,000, half in the city of Washington and about 85,000 in the Washington Suburban Sanitary District.

Prior to 1933 the District of Columbia including various Federal Government agencies, the Washington Suburban Sanitary District, and other communities in Virginia and Maryland were discharging raw sewage into the Potomac River and adjacent tributaries. As a result, the river ⁶ was polluted with sewage for a distance of more than 20 miles downstream from the Anacostia River. PWA allotted a total of \$15,613,635 on numerous Federal and non-Federal sewers and sewage-treatment works in Virginia, Maryland, and the District of Columbia, so that the wastes of more than 85 per cent of the population of this area will receive at least primary treatment.

FEDERAL-LOCAL COOPERATION

Joint efforts and cooperation between local governments and the Federal Government, such as that which has taken place in the Potomac River clean-up, have not been uncommon. Large Federal institutions are located in many municipalities throughout the country. Included among these institutions are schools, hospitals and prisons which are usually dependent upon the local source of supply for water, sewers, power, and other utilities. In many instances the population of such an institution, when compared with the population of the municipality in which it is located, exerts considerable influence on the need for local public works.

The United States Naval Academy, in Annapolis, Md., has a population of some 5,000 people compared with a popula-

⁶ Report of Board of Sanitary Engineers to the Board of Commissioners, District of Columbia, Sewerage and Sewage Disposal, December 22, 1933.

tion of 7,700 for the city of Annapolis. In 1933 it became necessary to increase the facilities for the collection and disposal of sewage in Annapolis. The availability of PWA funds for both Federal and non-Federal projects made possible the adoption of a satisfactory agreement between the Federal Government and the city of Annapolis. The city built adequate facilities for both, PWA providing the full amount for the Academy's share, and granting an allotment toward the cost of the City's share of the works.

A striking illustration of community benefit resulting from Federal-local cooperation exists in the sewage-disposal undertakings on the Mississippi River in the vicinity of Minneapolis and St. Paul, Minn. A \$6,623,500 non-Federal sewage-disposal project to clear the Mississippi at the Twin Cities was begun in 1934. There is, however, an army post at Fort Snelling and unless measures were taken to care for Fort Snelling, it would constitute a source of pollution in that region and serve to detract from the objectives of the Twin Cities project. Consequently, the War Department made an exhaustive study of the various methods for the efficient disposal of sewage from the Fort Snelling Reservation and concluded that the most practical plan to dispose of sewage was through a connection with the Minneapolis system under an agreement with the local authorities whereby they would be paid for the cost involved in treating the additional wastes. Accordingly, an application was made to the PWA by the War Department for this work and \$275,000 was allotted for the construction of the interceptor sewer system at Fort Snelling.

The construction of utilities as necessary incidents to projects undertaken by Federal departments and agencies themselves with PWA funds has meant much in the betterment of health and the improvement of property in the communities in which these Federal projects are situated. A total of \$3,451,530 was expended on 118 projects⁷ including sewage-disposal plants, sanitary and storm sewers, as well as refuse-disposal units.

⁷ Including combined sewer and water projects brings the total to 138 projects costing \$4,138,180.

GARBAGE AND REFUSE DISPOSAL

While progress in the construction of municipal sewage-disposal systems during the past few years has been considerable, communities have made less progress in constructing incinerators and other garbage and refuse disposal plants. Only 41 projects costing a little less than \$11,000,000 have been undertaken. Many of these, however, represent not only the finest plants of their sort in the world, but architecturally constitute attractive additions to the collection of public buildings in America.

Under PWA, the trend toward mechanization of garbage disposal, and especially sewage treatment has advanced. Definitely on the increase are complete chemical and mechanical treatment plants utilizing byproducts such as sludge for fertilizer and gas for power.

Despite the tremendous increase in sewage treatment during the past few years, a vast amount of improvement is still necessary before the problem is solved.

At the present time $1\frac{3}{4}$ billion gallons of sewage a day receive adequate treatment. Another $1\frac{1}{2}$ billion gallons receive only primary treatment. And $2\frac{1}{2}$ billion gallons of raw filth are being poured into the Nation's lakes and streams each day without any treatment.

It does not follow that all wastes require full treatment. But it does mean that each problem must be studied and that treatment adequate for that particular locality must be provided. This is necessary not only from social necessity but from the viewpoint of dollars-and-cents economy, for community after community has found that pollution costs money, in terms of lowered income from fishing, from recreation areas, from potential industries, and decreased property values.

The public has been awakened to the importance and need for waste disposal control works. Hundreds of communities now plan to provide such facilities, waiting only for the time when they can successfully finance their projects.



A MILLION-GALLON WATER-STORAGE TANK ERECTED AT NEWPORT NEWS, VA., TO REPLACE AN OLD TANK WHICH HAD BEEN CONDEMNED

Chapter XIII

Water Is Life



WATER is life. Apparently this fundamental fact must be learned on the battlefield of experience again and again. When this lesson is forgotten, even for a moment, the consequences are immediate and disastrous.

A brief lapse in maintaining the purity of a water supply occurred in 1928 in Olean, N. Y., a town with a population of 21,000. Typhoid germs rode into the Olean homes through the water pipes. Two hundred and thirty-eight cases of the disease resulted. Twenty-one people died. Court claims against the city mounted to a total of \$425,000.¹

¹ See "Water-borne Disease in New York State", by Earl Devendorf, Associate Director, Division of Sanitation, New York State Department of Health, *Journal of the New England Waterworks Association*, September 1933, p. 298.

To prevent similar disasters, engineers everywhere to whom the Nation has entrusted the purity of its water supply must be eternally vigilant.

Everyone realizes the necessity of a pure water supply from the standpoint of health. But the quality of the water supply is equally important. People will not and cannot drink muddy, discolored, or malodorous water, or water with harmful dissolved salts. Water must not only be satisfactory for drinking purposes, but also for household use and for industry.

Hard water, that is water with lime or certain other dissolved salts, requires the use of more soap to clean clothes and dishes, and that costs money. Unsatisfactory water also prevents industries from utilizing locations that are otherwise suitable. To some plants water is as important as fuel or raw materials. The chemical and dyeing industries offer examples.

VALUE OF GOOD WATER SUPPLY

The presence or absence of an adequate water supply can affect the destiny of an entire municipality or commercial area. Webster, N. Y., gave proof to this theory. It installed a waterworks system in 1936, which not only provided 1,500 citizens in the community with pure drinking water but also stimulated a wave of local prosperity.

Webster is in the heart of the central New York State farming belt. Every autumn long trains puff out of this lakeside region, bound for the Nation's dinner tables. The canning industry is one of the backbones of its business life, providing employment in the area. But a lack of adequate water for the washing and canning processes, hampered Webster for years.

Webster outgrew the well-and-bucket water-supply system back in 1910. Some springs were found and developed near the town. There was a little boom then. But it did not get far, for the growth of population soon outgrew the supply, and the springs dried up in the summer when the water was needed most. For 10 years water had to be brought in by

truck from nearby towns. In some years trucking the water cost as high as \$15,000 for the summer months.

Webster had about given up hope of building an adequate water-supply system when an application for a PWA grant was acted upon favorably. Work began at once. The completion of the project in 1937 called for a village-wide celebration.

Shortly thereafter a nationally known packing plant took option on property and began construction of a new packing plant. That meant a good many hundreds of thousands of dollars in annual wages to Webster citizens. Other concerns also became interested. The people, with new pay rolls in sight, began to build homes. Property values in Webster Township increased.

Webster housewives found the new water to be soft, and soap bills were cut. Also with the opening of the new system, fire-insurance rates dropped.

Neighboring towns watched all this with interest. As a result Forest Lawn, Penfield, and Union Hill have contracted to buy excess Webster water for their people, and have built mains to connect with Webster, bringing considerable revenue into Webster's treasury.

Other communities have also learned from experience the economic value and convenience of a dependable domestic water supply. Communities which have constructed new systems or have made improvements and extensions to their present systems including treatment of the water, have been rewarded by better public health, lower fire-insurance rates, financial savings resulting from less damage to domestic plumbing and industrial equipment.

PREVAILING DIFFICULTIES

A good, adequate water supply is not readily available to many cities in the United States. Most communities were founded where water was available, but growing populations and increased demands for industrial, commercial, and domestic use have made these original supplies inadequate. Some cities now have to go many miles for their sources of water.

Los Angeles water must cross mountains and deserts for a distance of 250 miles to make its rendezvous with the household faucets. New York City obtains a major portion of its supply from the Catskill Mountains, and is already reaching toward the Delaware River, 115 miles away, for an additional supply. Denver must bring a part of its water across the Continental Divide (see ch. XVIII). Even where sufficient water is available, treatment to remove mud, discoloration, and high mineral content must often be applied to make the supply satisfactory.

The whole problem of water supply is interwoven with that of proper sewage treatment and stream pollution. While Chicago, for example, can easily reach out into Lake Michigan for its needs, it has had to reverse the flow of the Chicago River so that its wastes would not be poured into its source of drinking water.

Other cities have had to put in expensive purification plants, and add chemicals to their drinking water on account of stream pollution that in many cases had been caused by neighboring municipalities. They had to add chlorine to destroy harmful germs; install filters consisting of sand beds; and to treat the water chemically to take out mud and discoloration and to remove the dissolved salts.

Because an adequate water supply is a prime necessity, communities have made more progress in this field than they have in sewage disposal and abatement of stream pollution. Because of increased demands made by modern industrial techniques and the tremendous new load brought about by the advent of air conditioning with its use of water for washing and cooling air, the supply in many cities today is nowhere near adequate.

In the decade 1919-29, municipalities spent an average of \$119,000,000 a year for new waterworks construction. By 1933, however, the amount dropped to less than \$47,000,000. Between 1933 and 1939 new construction rose to an average of approximately \$85,000,000 a year. PWA financed projects accounted for about 50 percent of this total. In all, PWA made allotments for 2,419 non-Federal waterworks

projects costing \$311,845,653,² actual construction varying from 37 to 77 percent of all new non-Federal waterworks construction a year.

VARIOUS UNDERTAKINGS

The benefits of this program have been widespread. Communities in every State have undertaken new construction of this type, the number of projects varying from 167 in Ohio to 5 in Delaware.

Typical of the assistance rendered to hundreds of villages and towns by PWA in installing new waterworks is that furnished by Wilton, Ala. (See ch. XVIII.)

The resourcefulness of engineers in providing water for municipalities in regions of long summer droughts is illustrated by the story of Snyder, Okla. Wells drilled into the semi-arid prairie yielded bitter-tasting, hard water in good times—and yielded nothing in summer, when water often had to be brought in by railroad tank car and doled out to the citizens. Three new water supply wells which were purchased in 1936 for \$15,000, failed in 1937. Snyder had almost given up hope, because any wells would be as bad and unreliable as the old ones, and the 1,200 people could not finance any other water system with their own resources.

The town's engineers, however, were given new hope by the prospect of Federal aid. The only feasible source of supply was Otter Creek about 5 miles away. They designed an earth-fill dam 40 feet high, a spillway out of solid rock, filter plant, pumping station, two 50,000 gallon reservoirs and a distribution system. PWA approved a grant of \$56,700. The town was able to raise the \$69,300 remainder of the funds necessary. Construction started in December 1937 and 6 months later the rock reservoir behind the dam was filled and a dependable supply of sweet, soft water was turned into the mains.

In Chicago, PWA helped the city start on a water-treatment program that has long been needed. The south end of Lake Michigan, from which Chicago's drinking water comes,

² See tables 9 and 11 in the appendix.

has periodically been badly polluted by sewage and industrial wastes. In 1923-24 a localized typhoid outbreak occurred on the south side due to this contamination. Although the water was chlorinated, there were occasions when the water was too highly polluted to make chlorine alone effective.

As far back as 1930 Chicago voted in favor of filtration by a majority of 69 percent of the ballots cast. Inadequate finances prevented any action being taken until July 1938 when a PWA grant of \$5,415,000 started work on the first of a huge series of plants, whose estimated cost is \$21,000,000. A modern rapid sand filtration plant is designed to treat 300,000,000 gallons of water a day removing dirt, harmful bacteria, bad odors, and discoloration. The project also includes metering of house connections to avoid waste and limit the capital cost of the plant.

PROPER WATER SUPPLY

PWA has been instrumental in detecting high fluorine content in water, which causes mottled enamel teeth in growing children under 8 years of age. This dental defect has been definitely noted in at least 260 areas in 26 States.³ In certain sections, such as the Texas Panhandle, this condition is widespread and serious. PWA has required due warning to the citizens of the fluorine content of the water and its effects. In cooperation with the State departments of health, it has encouraged treatment of such water. In certain cases, such as that of Bloomdale, Ohio, where, because of local financial conditions, the State department of health could not enforce necessary treatment of the fluorine water, PWA was able to help finance the cost of such treatment.

Another requirement by PWA that communities definitely prove a good adequate source of water before installing a water-distribution system has resulted in saving hundreds of thousands of dollars for communities.

In the case of Mina, Nev., where the State board of health did not have any sanitary engineering personnel, PWA sent

³ See "Facts about Fluorides," by Dr. H. Trendley Dean, dental surgeon, U. S. Public Health Service, in *Engineering News Record*, April 21, 1938.

an engineer to investigate a proposed waterworks system, involving a water of questionable quantity. It was found that due to recent earthquake shocks the flows of certain nearby springs had increased substantially and one spring especially could be depended upon to furnish an adequate supply of water for the needs of the town. It was found further, that the town on the assumption that a private individual owned both the land and water of this spring, had entered into a contract with this person, to buy his land and water rights for \$3,500, upon which the town had made several payments. The PWA engineer found that under Nevada water law the supposed owner had no legal right to the water, regardless of the fact that he had lived there for many years and used a small portion of the water for domestic purposes. The county officials were informed of this fact by the PWA and the town filed an application with the Nevada State engineer to appropriate 1 second-foot of the unused spring water as a protective measure, to insure the use of the water for the new proposed town waterworks system, thereby assuring a substantial financial saving to the town.

TREATMENT PLANTS

The PWA waterworks program has resulted in the installation of many water-softening and iron-removal plants in accordance with recommendations of State departments of health, providing water of a more satisfactory quality and involving less expense in plumbing repairs and the cost of extra soap and effort required by hard water. Other plants provided for chlorination of water to insure killing of harmful bacteria, filtration for purity, and aeration to remove odors. In connection with PWA waterworks projects, more than 500 treatment plants of various types have been constructed.

An outstanding feature of the waterworks construction program is the large number of villages, towns, and unincorporated communities which have been enabled to install public water systems. Hundreds of communities which had been unable to afford public waterworks, formed water districts or incorporated as villages or towns in order to obtain

PWA aid in providing the advantages of a public water system to their citizens. An analysis of the PWA programs made on January 19, 1937, showed that 700 communities ranging in population from 200 to 6,000 installed complete new waterworks systems. Seventy-five percent of the communities had a population under 1,000.

This has meant a major change in the life of many small communities and villages. Householders that formerly had to carry water in buckets and pails from back-yard wells, or from neighbors' wells, or in some instances from the village pump, now are assured not only of a dependable water supply but also of one that is safe. For such householders the old-fashioned methods of hauling water, with their drudgery, have been replaced by the simple device of turning a domestic faucet. With all these advantages, the modern water-supply system is cheaper than installing individual wells, cisterns, and rain barrels.

ECONOMIC BENEFITS

Installation of public waterworks systems stimulates communal growth and industrial expansion. Typical of many small villages and towns, which like Webster, N. Y., have been assisted by PWA, is Tyronza, Ark. (population 573, 1930 census). With a loan of \$18,800 and a grant of \$7,200, Tyronza constructed a complete new waterworks system by July 27, 1935. Between that date and March 30, 1937, 2 new cotton gins, 3 business buildings, and 10 houses were built in the town.

Similarly, among other economic benefits is protection against loss by fire. The total value of the property furnished adequate water supply and fire protection by PWA waterworks projects runs into the billions of dollars.

The more nearly new waterworks systems and improvements and extensions to existing systems provide a dependable and adequate water supply to all sections of a community, reduces the possible loss from damage by fire, and lowers the fire-insurance premiums on dwellings and industrial establishments. A study made of the 700 new PWA

waterworks systems, costing \$35,250,757, constructed in small towns and villages, showed that the saving in fire-insurance premiums alone amounted to \$500,000 yearly.

A survey of actual savings in fire-insurance premiums shows that in four States, benefiting from the PWA waterworks program, insurance rates on homes have been lowered from 10 to 50 percent. In South Carolina, which had a very high fire-insurance rate, at least 28 communities which completed waterworks projects benefited from resultant savings of 34 percent in fire-insurance premiums on brick mercantile buildings, 43 percent on brick residences, 36 percent on frame dwellings, and 10 percent on frame mercantile buildings. In Ohio similar savings have extended to 50 percent on brick residences and as much as 43 percent on frame dwellings. In West Virginia, where at least 12 towns obtained new waterworks through the PWA program, the fire-insurance premiums were reduced 24 and 16 percent, respectively, for brick and frame mercantile buildings, and 46 and 43 percent on brick and frame houses. In Texas, among towns completing PWA waterworks systems, the fire-insurance premiums were reduced as follows:

Town	Before	After	Annual premium saving	Cost of improvement
Arp.....	\$1. 00	\$0. 72	\$1, 400	\$28, 665. 13
Big Sandy.....	1. 00	. 53	1, 410	60, 634. 97
Bridgeport.....	. 90	. 49	2, 050	143, 120. 12
Canadian.....	. 44	. 39	450	24, 023. 86
Denison.....	. 20	. 17	2, 400	60, 000. 00
Glen Rose.....	. 95	. 59	1, 440	62, 678. 44
Goose Creek.....	. 36	. 34	500	28, 642. 57
Grandview.....	. 76	. 72	360	7, 290. 50
Hallettsville.....	. 52	. 46	600	20, 735. 20
Hearne.....	. 42	. 39	420	20, 303. 48
Humble.....	. 99	. 49	3, 000	88, 294. 77
Leonard.....	. 58	. 54	360	4, 625. 46
Linden.....	. 79	. 55	1, 600	50, 661. 65
Naples.....	. 98	. 47	2, 040	46, 666. 41
Pasadena.....	. 45	. 37	800	38, 364. 84
Pecos.....	. 52	. 34	3, 600	294, 952. 75
Pittsburg.....	. 59	. 41	2, 880	108, 543. 25
Round Rock.....	. 82	. 48	1, 360	45, 357. 28
Santa Anna.....	. 61	. 44	1, 900	32, 430. 35
University Park.....	. 34	. 24	8, 000	126, 181. 68

The benefits of the PWA-financed water systems built in the depression years have been many. Aside from millions of man-hours of employment, PWA waterworks have furnished a public supply of suitable water for the first time to a population⁴ of more than 2,000,000.

It must be borne in mind that nearly every one of these projects is income producing. In a number of cases, the local share of the cost is made up by the sale of revenue bonds, based on earned income, and not on general taxation.

The new supplies of water with which have come savings in fire-insurance premiums, in plumbing maintenance, in costs of soap and other cleaning agents, have enabled the construction of new sewage systems, for water is used as the carrier of wastes. In many communities, the construction of a waterworks system under an early PWA program enabled that same community to build a sewage system with Federal aid under a later program. About one-fifth of the waterworks projects should be classed as multiple projects, where the community undertook to furnish water and sewage services at the same time (see ch. XII).

The Nation has made great strides toward furnishing the citizens with adequate supplies of water. But there are still many small, unincorporated communities which need and are preparing for public water-supply systems, while many larger communities find themselves ever in need of extensions and improvements. With the growing urbanization of the country and with the new industrial and domestic techniques calling for ever-increasing supplies of water, the importance of construction in this field of public-works service will continue.

⁴ Preliminary estimate.



SUPER PIERS FOR SUPER SHIPS. PWA MADE GRANTS TO AID THE CITY OF NEW YORK TO BUILD THREE PIERS COMPRISING THE LARGEST AND MOST MODERN SHIP TERMINAL. DOCKED AT THIS "INTERNATIONAL GRAND CENTRAL STATION" ARE (FROM TOP LEFT TO BOTTOM RIGHT) THE S. S. "EUROPA," "REX," "NORMANDIE," "GEORGIC" AND "BERENGARIA," FIVE OF THE LARGEST SHIPS IN THE WORLD

A M E R I C A B U I L D S

Chapter XIV

Land Sea and Air



A YOUNG country struggling to extend its frontiers westward to the Pacific, trying to weld a wilderness into a Nation, fostered new techniques of transportation to attain its goal. As a result, American history is the pageant of the stagecoach, the pony express, the canal boat, clipper ship, the steamboat, the railroad, the automobile, the airplane. These have been America's answer to the challenge to develop a means of communication to hold together a new, great nation.

The physical frontiers are nearly gone, but the pioneer spirit in transportation lives on. Time unrelenting in its passage demands greater speed on land, water, and in the air. The same spirit that led earlier Americans to develop

these new modes of transportation now demands constant improvement. Congestion in cities leads to improved traffic routes. Highways between crowded urban centers are being separated to provide ways for local and express traffic.

Competition between air, road, rail, and water has raised standards of efficiency, comfort, and safety. PWA has contributed to improvements in each field according to the need, and the total is impressive. About one-third of all PWA funds have been allotted for transportation, providing for Federal and non-Federal projects with a total estimated cost of \$1,910,159,338.¹

By far the greatest amount, \$750,632,994, went for roads and highways. Typical of the benefits this type of improvement has produced is the Oregon Coastal Highway.

THE OREGON COASTAL HIGHWAY

Mountains and sea combine to make the Oregon coast the mecca of tourists and sportsmen. Deer and game roam the wooded slopes of the Coast Range; trout and salmon fill the streams; the finest beaches in the world curve in long shining arcs from headland to headland, but the wide estuaries of the Pacific, cutting deep into the narrow strip of land between the shore and the coastal range put up such an effective barrier to travel that for many years, few visited the region.

When the State highway commission, seeking to find a short route from California north, began the task of opening the coast highway, they found many sections still Indian and primitive. The few roads were merely reminders of the wagon trails of the pioneers. There was a suspicion that the pioneers had followed original animal trails, and on a clear day, some of these could still be seen.

But the State highway commission did not have funds to pave the highway, and bridge the six rivers and bays that space the 200 miles between Newport and Gold Beach.

At one point, unwary travelers frequently were trapped in quicksand, forced to hurry to firm land while their car slowly

¹ For summary of all PWA allotments for transportation projects see table 13 in the appendix.

disappeared. Native guides earned livelihoods by piloting strangers around the bog. At other points, the hardy motorist admired the view while the tide receded, and he could drive over the beach, less treacherous than the bogs.

Estuaries were crossed by private ferries, which ran when the spirit and pecuniary motives moved them. Missing the evening boat meant waiting till morning. It was an expensive and unhurried trip. Few residents of the towns had ever visited neighboring villages.

Gold Beach, Marshfield, and Newport, realizing their growth was retarded, formed the Oregon Coast Highway Association, to improve the coast road. The State went as far as it could, even completed the first of six proposed toll bridges, and took over the ferries in 1932. Then work stopped, and an application was made to the Reconstruction Finance Corporation for a loan.

The application was still pending when PWA undertook to aid national recovery and made a loan of \$3,993,800, and added an outright grant of \$1,608,200. The remaining bridges spanned Coos Bay, the Umpqua River, the Sinslaw



THE UMPQUA RIVER BRIDGE AT REEDSPORT, OREG., ONE OF FIVE BRIDGES
BUILT IN CONJUNCTION WITH THE NEW OREGON COASTAL HIGHWAY

River, Alsea Bay, and Yaquina Bay. Complex engineering problems had to be overcome, in the face of rushing tidal currents. Solid rock was found for some foundations. Other great bridges rest on piles. In some sections, tidal currents washed sand out from around foundations, but several thousand cords of brush checked the current, caused the sand to be redeposited. Over 182,000 barrels of cement, 12,300 tons of steel, 16,000,000 feet of lumber, 504,000 feet of piling, and 2,272,575 man-hours of labor at construction sites went into those bridges.

The residents of the towns along the coast joined in a great celebration at Newport, when the Yaquina Bay Bridge was opened in 1936, for the job was complete. Motorists found 400 miles of uninterrupted, broad, smooth, paved highway from the California border to Astoria, Oreg.

Visitors promptly took advantage of the new vacation land. Traffic more than doubled. Prosperity came to many communities in the wake of singing tires. Merchants, hotels, restaurants, tourist camps, towns, and beach resorts resounded to the merry chime of cash registers.

ADVANTAGES OF GOOD ROADS

Building new arteries of transportation like the Oregon Highway has had a profound effect on national life. Each year tourist travel becomes a greater factor in our economic system. Upon the back of the restless American people rides a great new industry. Today, the economic welfare of millions depends on roads. The wages of attendants at gasoline stations, barbecue stands, restaurants, ice-cream huts, tourist camps, and farmers' produce stands are generated by the passing motorcade.

But roads do more than bring prosperity on rolling rubber. Figures prove that roads put more direct labor per dollar to healthful work than any other major type of construction. Furthermore, they serve other economic and social purposes. For example, they open up markets to the farmers. PWA has built over 9,000 miles of farm-to-market roads at a cost of \$93,889,513. Down these roads come a long and varied list of

produce, to grace the Nation's dinner tables, and help diversify the farm production, and on the same roads comes the farmer's wife to trade in the shopping centers.

Still roads go beyond that, for roads mean better education to millions of young Americans. The centralized school is partly a product of good roads, for it depends on the ability to gather children from a large area. Those same roads also bring adults to the schools, which in the evenings often become community centers for adult life.

Hospitals too have been made more available to rural America because of roads. All have heard of and admired the country doctor who would abandon his automobile to travel on foot or horseback to reach an isolated case and operate on the kitchen table under a kerosene light. Roads changed the situation, so that patients now can be brought to hospitals—many of them built with PWA funds following road improvements.

In all, PWA has allotted \$591,016,109 for the construction of roads and highways. Up to the start of the current program, this money had built, or rebuilt 36,628 miles of highways and roads in every part of the Nation. That is the equivalent of 12 new roads from coast to coast.

The results of this great program can be seen in the highway reviews of the engineering magazines. Here headline after headline reads, "Pennsylvania eliminates hazards," "Rhode Island plans bypasses," "Connecticut plans arterials," "Virginia betters surfaces," "Massachusetts work active," "Kentucky modernizes," "Illinois enters rebuilding era," "Colorado completes cross-State routes," "Washington improves design standards."

Of course, not all of the work done in the States is the result of the PWA program, yet a large part of the improvement that has been made possible, in the last few years has been financed with PWA funds.

Minnesota provides a typical example. With PWA funds under the supervision of the Bureau of Public Roads, Minnesota has built 2,526 miles of roads and highways costing \$13,862,443.

Now PWA did not confine its attention to rural areas. Traffic can get just as hopelessly mired in city streets as in country lanes. Astoria, N. Y., only three-fourths of a mile from Manhattan's teeming millions, was just as isolated before Triborough Bridge was built as Astoria, Oreg., before the coast highway was completed.

TRAFFIC SOLUTION

The scope of this work is shown in New York City, where PWA has helped considerably to remake the transportation facilities of the Nation's largest city. The great \$40,000,000 Lincoln Tunnel under the Hudson was one of PWA's early projects—followed by the \$58,365,000 East River Tubes still under construction. Triborough Bridge, along with half a dozen smaller bridges, opened new arteries in the city's stagnating traffic stream. A \$25,000,000 allotment completed miles of city-owned subway that had stood an empty shell until PWA funds opened it to use. Staten Island eliminated a score of grade crossings that had collected a yearly toll of accidents. PWA funds are now building the great East River Drive and Belt Parkways, almost 40 miles of new-type highway destined to speed traffic around congested centers.

The New York picture is not complete without PWA's great superliner piers—a new International Grand Central Terminal for ocean-going vessels, the widening and deepening of harbor channels with PWA funds, and the electrification of the Pennsylvania divisions which helps speed visitors and commerce to and from the city. It is a scene in which PWA could be allegorically depicted as striking the traffic chains which bound the city.

In a thousand other cities and towns, PWA funds have installed street lights, traffic signals, safety islands; eliminated grade crossings, built new streets, repaired others; built new bridges, tunnels, subways; in fact every imaginable improvement to the Nation's urban gasoline-powered transport system. In this category PWA has helped build 1,400 projects costing \$599,046,187.

From coast to coast, such projects as the Alameda-Contra Costa Tunnel in California, the Davenport Bridge across the Mississippi, the Chicago subway, the Deer Isle Bridge in Maine, the Overseas Highway in Florida, the Mobile Tunnel in Alabama, are lasting monuments to PWA aid in depression years.

Perhaps the most notable of these is the subway project in Chicago which PWA funds made possible after the City Fathers had discussed the matter and built up hopes for almost half a century. The only city of its size in the world without such a convenience, Chicago now plans to relieve the congestion in its world-famous "Loop" by 7.2 miles of underground passageway as a start. This \$40,000,000 project for which PWA made a grant of \$18,000,000, is now under construction, bringing closer to reality the desires of several generations of Chicago citizens. Completion is expected in 1940.

PWA's grant of \$5,709,000 toward a \$25,349,000 addition to the subways of New York has made 18 miles of empty



RAILROAD UNDERPASS AT SEATTLE, WASH. OVER 600 RAILWAY CROSSINGS
HAVE BEEN ELIMINATED WITH AID FROM THE PWA PROGRAMS

shell that stood idle since the depression set into action a latent transportation system. The allotment provided for stations, tracks, signal equipment, ventilation, turnstiles, and many other things necessary to complete a subway line.

In Philadelphia, a PWA allotment of \$2,782,640 helped build 2.26 miles of rapid transit lines across the Delaware River Bridge that connects Philadelphia, Pa., and Camden, N. J.

PWA with a view to the new needs of the Nation has joined in helping Pennsylvania to build the new State "dream highway." One hundred and sixty-two miles from Harrisburg to Pittsburgh, without an intersection in its entire length, this new \$68,000,000 road has been planned to speed traffic over an abandoned railroad right-of-way. Eliminating all grades over 3 percent, the road is to plunge through six tunnels in the mountains. Outside of the tunnels it is to be a four-lane road, separated by center grass parkways. The plans point the way for future types of express roads to meet new demands of the Nation. This project has been designed to be a self-liquidating toll facility, as are many of PWA's great new traffic-handling machines.

GRADE-CROSSING ELIMINATION

Along with the new highways and bridges, PWA has aided in eliminating one of the Nation's greatest menaces—the railway grade crossing. Under the \$400,000,000 statutory allocation of PWA funds to the Bureau of Public Roads for highways, 492 grade separations were built. In addition, communities and States have applied for PWA aid for 40 projects costing \$36,292,483 to eliminate 117 of additional death traps.

AID TO RAILROADS

Roads have and are remaking the map of the Nation, but the major cities are still strung, like beads, along the shining steel lines of the railroads. The mightiest industries are spiked to the cross ties, for the railroads are still superior in mass transportation of heavy goods for long distances.

For many years railroads had little competition. But they suddenly awoke to find the automobile, the truck, and the airplane cutting into traffic, and their own systems so handicapped by antiquated and durable equipment that they could not meet the needs of a Nation demanding speed, convenience, comfort, and flexibility.

PWA sought to help the railroads out. Being private corporations, they were not eligible for grants, but PWA made loans totaling upward of \$200,000,000 to 32 railroads for improvements so that they might catch up.

The outstanding allotment was the \$31,900,000 loan to the Pennsylvania Railroad² for completion of electrification of its lines between New York and Washington, and \$6,290,000 for purchasing electric locomotives, bringing the two cities 1 hour closer to each other. On many another railroad, the Diesel-powered, lightweight streamlined trains, such as the Rebel of the Gulf, Mobile & Northern Railroad in the South, and the Flying Yankee in New England, that daily flash thousands of people from city to city, are the results of PWA loans. Still other railroads used PWA funds to iron "kinks" out of roadbeds, improve rights-of-way.

These allotments, made in the early days of PWA, enabled the railroads, normally one of the Nation's great employers, to recall many men to their jobs. In July 1934 nearly 70,000 men were working in on-the-site employment in work financed by PWA railroad loans. And the majority of these loans, \$115,000,000 of them, were sold to the public at a profit of \$4,534,000 to the Government. Another \$50,000,000 were resold to issuers at a premium to the Government of \$282,000. Out of the total of \$200,974,500 of railroad securities, only \$36,000,000 are still held by the Government.

WATER TRANSPORTATION

Water still provides the cheapest form of transportation for tonnage. Long ago, the Federal Government recognized

² Total loans to the Pennsylvania Railroad amounted to \$70,165,000 for completing electrification of its New York to Washington division, building 68 electric locomotives and 7,000 new freight cars, and purchasing 33 electric locomotives and 98,787 tons of rail.

the significance of water transportation and aided in the construction of lighthouses, harbors, and canals. PWA carried on this work with allotments of \$278,693,815 for aids to navigation.

Practically all major harbors in the east, south, and west coasts, and in the Great Lakes had channels widened and deepened or other work done by PWA funds allotted to the Army Engineers Corps. Bigger ships came in closer and safer, guided by lighthouses and radio beams, PWA built.

In dredging rivers and in channel rectification, the most important work was done on the Mississippi River, from its mouth to St. Paul-Minneapolis, and on the Missouri, Ohio, and Illinois Rivers. All-year facilities are being provided for the movement of ocean-going vessels between the Gulf and the Great Lakes. For this work PWA allotted more than \$100,000,000 for 96 projects. Improvement of facilities in canals and channels is typified by the Cape Cod Canal; deepening and widening of channels in New York Harbor, in Great Lakes ports, and along the Gulf coast.

PWA has furthered the construction of dams and locks on the Mississippi River and its tributaries. The Fort Peck Dam on the upper Missouri is one of the largest and most important for which PWA has allotted more than \$49,000,000. This will insure navigation on the Missouri River the year round. Bonneville Dam in the State of Washington may be mentioned again, as may many others heretofore mentioned.

Wharves, piers, docks, and waterside cold-storage plants and warehouses have greatly added to the facilities for handling foreign and coastwise shipping. New York constructed three superpiers costing \$5,000,000 with the aid of PWA and provided facilities for handling with dispatch the passengers and freight of such liners as the *Queen Mary* and *Normandie*. Others are typified in the facilities constructed at Morehead City, N. C.; Mobile, Ala.; Gulfport, Miss.; and Houston and Corpus Christi, Tex.

PWA has allotted \$37,550,462 for 579 projects to provide new Coast Guard ships, and Coast Guard stations to protect water-borne commerce.

THE AIRWAYS

Finally, in this summary of PWA aid to the communication system, there is the newest medium of transport—the air. Destined to become the most important medium in a speeded up world, PWA has aided here also.

As the volume of traffic by air increases the need for airports and safety devices become more imperative. Allotments have been made for 354 Federal projects costing \$14,773,008 to improve landing fields, for route lighting, radio beams and mapping, and for developing new safety devices and new techniques. Most interesting of the latter are the three wind tunnels at Langley Field, Va. In one, a full-sized airplane may be tested in flight, in a giant wind tunnel that generates a gale of 200 miles an hour. In other tunnels wind velocities of 400 to 750 miles an hour are preparing for future air transportation at speeds of tomorrow.

On the shore of the historic Potomac River, a few miles from the White House, Federal agencies have undertaken the construction of a 750-acre air terminal, which is designed not only to serve the Capital with aviation transportation facilities for land and sea planes, but also as a model for the rest of the country. This new airport provides four paved runways, 150 to 200 feet wide and at least 5,000 feet long, with unobstructed approaches in eight directions at flight angles as flat as 1-to-40, together with necessary drainage, lighting, fencing, and other facilities. The plans made also include a large terminal building and at least one hangar with auxiliary service buildings.

At the same time local communities have undertaken 30 projects—mostly airport construction costing \$10,645,922. The local governments have put up \$6,082,669 to win Federal grants of \$4,563,253. An outstanding example is the fine new field with shops, hangars, and administrative buildings at Providence, R. I., which although unfinished at the time, withstood the disastrous hurricane of September 1938.

Of course, all projects not completed before the Civil Aeronautics Authority was created in June 1938 were asked to obtain approval of that body before final payment could

be made by PWA. Under the current program all applications were approved by CAA before PWA allotments were recommended.

On land, sea, and in the air, PWA has helped the Nation's all-important transport mechanism to try to catch up with the demands of a new day.



CITY HALL SKYSCRAPER. KANSAS CITY, MO., CONSTRUCTED THIS STRIKING BUILDING WITH PWA ASSISTANCE

A M E R I C A B U I L D S

Chapter XV

For Government Business



THE vast majority of PWA allotments have been made for the services which governments have traditionally supplied, such as roads, water and sewage systems, hospitals, and schools—the services that people everywhere undertake in common.

People today have come to expect government to furnish a vast number of other services “to establish justice, insure domestic tranquillity, to provide for the common defense, promote the general welfare, and secure the blessings of liberty * * *”

This demand for public services has thrown a tremendous burden on government machinery and on existing facilities for handling the business of government. Administrative,

legislative, and judicial tasks have multiplied. By and large the housing of these functions in an efficient, decent manner has not kept pace with increased functions and duties.

Among the thousands of applications which have come to PWA, there are many that reflect the needs of the country in this respect. They have shown public business carried on in buildings designed for the needs of a half a century ago.

A COUNTY COURTHOUSE

Alameda County, Calif., decided that the Hall of Records (the county courthouse) in Oakland, which had been built in the 1870's, had outlasted its usefulness. The citizens found in their Hall of Records no source of civic pride.

It was such a little courthouse for such a big and wealthy county. It was so little that the citizens had to pay \$25,000 a year extra to rent space for essential functions in buildings scattered around Oakland. Sixty years of records bowed the floors. Since the structure preceded modern plumbing and electric lighting, the building was unsanitary and uncomfortable. Although it was red brick outside, the inside was a wooden shell—a fire hazard that may have burned, destroying all the valuable records with it.

A Federal grant of \$462,000 started a new \$1,988,000 eleven-story building soaring skyward in 1934. Into this new structure were gathered all the scattered administrative activities ¹ of the Alameda County government. Although big enough to house all officials, the county officials, having witnessed the tremendous rise of services required of the government, provided for later additions.

Alameda County's new courthouse is only one of 630 State, county, and municipal buildings and city halls costing \$148,374,660 which have been built and for which PWA made allotments. This does not include one new State capitol.

¹ Twelve courtrooms for the superior courts, 1 justice courtroom, district attorney office, law library, county board of supervisors, and offices for county clerk, registrar, recorder, treasurer, auditor, tax collector, assessor, coroner, surveyor, accountant, purchasing agent, development commission, charity commission, and library. Also superintendent of schools, board of education, bureau of weights and measures, public administrator's office, adult probation office.

PWA was called on for funds for a State capitol because of what happened on the night of April 25, 1935. On that night Salem, Oreg., was roused by clanging bells, and screaming sirens. The State capitol was in flames. Firemen and citizens alike battled to halt the blaze which swept through the beautiful Georgian structure. The next morning found the building and most of its valuable records in ashes.

OREGON CAPITOL

That same morning, while Oregon took stock of its loss, PWA officials called the Governor and offered to help the State rebuild its capitol. A short time later a new building was rising on ground still dark from the ashes of the old one. Oregon's new capitol was built from a design selected in a Nation-wide competition.

Built of warm white marble, transported across the continent from quarries in Maine, and topped by a golden statue depicting the Oregon pioneer, the capitol, while of a new architectural style, is typically American. More important documents in its vaults are forever safe from the ravages of fire.

The financial assistance of PWA, of course, has been always as readily available to small communities as large ones. This has been true of schools, and hospitals, and waterworks, and it has also been true of city halls and courthouses.

Featured in a nationally distributed newspaper cartoon as a town without a courthouse, a church or a railroad, Gainesville, county seat of Ozark County, Mo., has, with PWA aid, lost that dubious claim to fame. The town applied for and received approval of a \$16,380 grant toward the \$36,400, two-story courthouse and jail erected in the center of the city square.

In many small towns, municipal structures house a variety of services. When the old combination fire department, municipal building, police station and jail in Delaware, Ohio, burned down, city offices were lodged in an abandoned high school; the city prisoners were boarded in the county jail; and the fire department lodged in rented garage space. A

new fireproof building now provides a fire station and dormitory, a police garage, city office, jail, council chamber, engineer's offices.

POLICE AND FIRE STATIONS

Coupled with the prime governmental functions housed in new city halls are such services as police and fire protection. Increased safety for millions of urban and suburban dwellers has been provided through the aid given modern facilities for these arms of government. In addition to the police and fire stations included in city halls, PWA has made grants for more than \$15,315,500 worth of municipal safety facilities such as new fire and police stations, police radio-communication systems and fire-alarm systems.

It is hard to calculate the dollar return from these improved protective facilities. But in many cases cities have been able to obtain substantial reductions in their theft and fire insurance rates paid by their citizens after the new equipment was installed. Charlotte, N. C., with \$41,000,000 invested in 200 cotton mills, cotton-oil plants, knitting mills, refining plants and other industries had much at stake. Yet the application to PWA stated that some sections of the city were a mile and a half from the nearest fire-alarm box. An allotment provided 126 new alarm boxes, which have resulted in reductions in insurance rates.

Modern fire stations and equipment have been made possible in dozens of cities. In Des Moines the central fire station was located in a congested area so that there were consistent delays in answering calls and an ever-present danger of serious accidents as fire equipment was being moved through heavy traffic. A new station was built in a location from which most parts of the city can be reached with minimum delay.

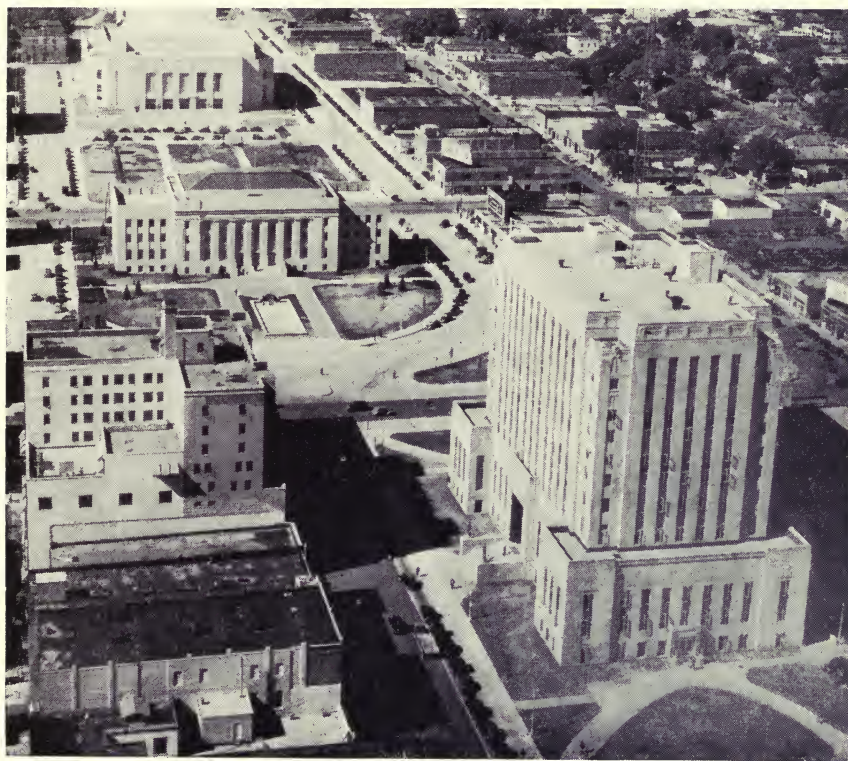
PWA has also improved police-communications systems. In Boston a PWA grant enabled the city to install a radio transmitter, and place receiving equipment in the squad cars, as well as provide for the complicated coordination system which enabled headquarters to keep tab on the loca-

tion of each car and check how quickly calls for aid are answered, and send additional help if necessary.

Many of the new police headquarters built under the program have modern crime-detection laboratories, dormitories, and garages for equipment, and also provide temporary jail facilities.

JAILS AND PRISONS

Many of the jails replaced by new structures have been "disgraceful," according to the applications. In Atlanta the city jail was both inadequate and overcrowded. Before the new structure was erected, prisoners slept on the floors of the multiple cells or "tanks," when the cells were crowded. Police headquarters were likewise cramped. A new five-



THE NEW CIVIC CENTER IN OKLAHOMA CITY, OKLA., SHOWING THE CITY BUILDING, THE MUNICIPAL AUDITORIUM, AND THE PUBLIC SAFETY BUILDING, CONSTRUCTED IN THE HEART OF THE CITY ON LAND FORMERLY USED BY THE RAILROADS

story structure provides modern office and laboratory space, a 30-car garage, and four floors of cells.

One application gave a grim picture of conditions in the old Barton County, Mo., jail.

Jail erected shortly after the Civil War, of pine boards laid flat and spiked together. Jail always wet and moldy, and prisoners' shoes frequently drop off. Inmates bathe in a washtub and no hot water. Heating by stoves. Vermin, rats, and mice abound, and rats had to be killed with a target rifle. Jail breaks are frequent and at will. No fit place for any prisoners * * * Jail bars easily cut in two with corset steel handmade files. Practically every grand jury for 30 years has condemned the jail as unsafe and unsanitary, and has recommended a new jail.

The Barton County jail was replaced by a modern \$36,363 structure.

For the more permanent guests of law-enforcement agencies, PWA has provided new prisons and penitentiaries, including additions and improvements to some of the best known penal institutions. At Sing Sing, Auburn, Joliet, Atlanta, and Alcatraz prisoners are housed in new PWA-financed buildings equipped with the latest tool-proof steel bars and safety and locking devices. In all, PWA has made allotments for 126 non-Federal prisons and jails costing \$24,478,700 (excluding those in police headquarters and courthouses), and for 75 Federal prison projects costing \$14,914,000, including new correctional institutions for short-term Federal prisoners in Colorado, Connecticut, Kentucky, Texas, and Indiana.

AUDITORIUMS AND CIVIC CENTERS

An enterprise commonly undertaken by cities is the provision of civic centers and meeting halls. Auditoriums frequently have been included in city halls. Such meeting places vary in size all the way from small rooms in rural town halls, through the thousands of auditoriums, gymnasiums in school projects which are utilized as community centers, to such great civic centers as the ones in Kansas City (see ch. XVIII) and in Oklahoma City.

Oklahoma City has risen, as its citizens say, from tepees to towers in 50 years. Oklahoma City, like many other cities

in the Southwest, grew so rapidly that it was almost impossible for public building to keep up with its growth, much less to be planned ahead.

In the 1920's Oklahoma City decided to do some planning. For one thing the city was cut in half by railroad tracks which ran right through the heart of town. Removal of the tracks would solve what otherwise was an almost insuperable traffic problem, and open up a new business area. In a trade with the railroads, Oklahoma City obtained the right-of-way, equal to about four city blocks in the center of the town, and the railroads routed their tracks through the outskirts of the city.

The city planned a coordinated civic center which would contain a city hall, a municipal auditorium, and a courthouse and city jail. In 1935, with PWA allotments of \$1,462,491, work on the four buildings started simultaneously.

Built of gray limestone, surrounded by landscaped lawns, walks, and fountains, brilliantly illuminated at night, the civic center development is today one of the most impressive sights in America.

Buffalo's convention hall and music hall and the auditoriums in Topeka, Kans., Fremont, Nebr., Asheville, N. C., Mobridge, S. Dak., Barre, Vt., Charleston, W. Va., and Hammond, Ind., are examples of what some cities are doing to provide meeting places, as well as to assist local trades by attracting conventions to their cities. Typical of the increasingly popular community centers in smaller towns is the new building at Gadsden, Ala. Before the community center was built there were no adequate facilities for town meetings, banquets, sports events. Neither was there a swimming pool within the city. Lumping all their needs together, Gadsden provided a hall seating 2,000 for meetings, banquets, conventions, and sport events. The center also includes a large swimming pool, and a refurbished golf course. The hall contains stage equipment for theatricals, offices and club rooms for civic clubs. The center is also used by the National Guard which has offices and drills there.

ARMORIES

In other cities, armories are used for meetings and conventions. Outstanding among the newly built armories is the National Guard Armory at Minneapolis, Minn. In 1929 the old armory, which had been built more than 30 years before, was condemned, leaving no suitable space for the use of the area's 18 National Guard units which were scattered throughout the city in rented quarters.

The State in 1933 established a special commission for the building of armories and an application was filed with PWA. The new building, which cost \$902,000, contains a main drill hall with balconies seating 3,500. Supply, staff, and company rooms are available for each unit and there are two rifle ranges in the basement. The armory has also been useful as a center for sports events, which bring an income of \$16,000 a year. This, with revenue contributed by the War and Navy Departments, the State, and the city of Minneapolis, brings the total income to \$76,000 while the annual



A MODERN NOTE IN FIRE STATIONS. DES MOINES, IOWA, HAS BUILT THIS STATION TO HOUSE SOME OF THE CITY'S FIRE FIGHTERS AND THEIR EQUIPMENT

cost of operating and maintaining the armory is only \$28,000.

All together PWA provided allotments of \$6,650,258 to assist in the construction of 50 auditoriums (not including those built in connection with schools, city halls, etc.) costing \$16,857,400, and 52 armories costing \$13,167,800.

MEMORIAL STRUCTURES

Like the armories, many memorial structures built with PWA assistance are being used as civic centers. The base of the towering Sam Houston Memorial in Texas contains assembly rooms and banquet halls that are used for civic functions. The Will Rogers Memorial at Fort Worth seats 10,000 at athletic events, rodeos, track meets and horse shows.

A number of the projects, such as memorials, are less typical of PWA projects in general. Nevertheless, these miscellaneous structures are socially desirable and of permanent value. Many of them are set up as income-producing enterprises designed to increase the wealth of the community or to provide greater opportunities for residents.

PUBLIC MARKETS

As an example, PWA has helped 21 communities provide adequate markets where the farmers may sell their produce to housewives at reasonable prices.

In Columbia, S. C., where PWA financed a new market to replace one which had been in service for many years and which was no longer satisfactory, the rental of stalls brings in approximately \$4,824 a year although all charges, including bond interest, maintenance, and depreciation amount to only \$3,400 annually.

The oldest and most famous institutions of its kind in the United States is the French Market at New Orleans. Under the flags of three nations over two historic centuries, the market has been the chief retail center of the city. Today, in addition to being a shopping place for gourmets, it is a great wholesale market where farmers and fishermen sell their wares. Every day trucks arrive, laden with Florida cucumbers, Louisiana peppers, Texas broccoli, others with

red snapper and mackerel from the Gulf, shrimp from the bays, soft shell crabs from the bayous.

A series of low buildings stretching for several blocks, the market by 1936 was old and, as such, difficult to keep as clean and sanitary as the health authorities insisted it should be. PWA made a loan of \$300,000 to a nonprofit association which operates the market and by 1938 the rehabilitation of the historic old buildings was complete. The buildings were strengthened and extended, sanitary floors installed, and other improvements, including sheds, for the long lines of trucks which appear at the market every morning before dawn, were made but the original lines of the buildings have been kept intact.

MISCELLANEOUS PROJECTS

Further examination of the list of PWA projects reveals many another business carried on by local governments for the common good. In Mobile, Ala., the State built a cold-storage warehouse as a revenue project. In Port Lavaca, Tex., the municipality built a cannery so that its citizens could obtain their share of the Gulf coast oyster and shrimp canning business. The \$78,120 in revenue bonds issued to finance the local share of the cost of the project are being paid off out of the income from the processing and canning plant, ice plant, and the equipment to handle poultry as well as fish.

The city of Stockton, Calif., received an allotment to help build a \$60,000 cotton warehouse, to be leased to the Port Authority to afford adequate facilities for handling, warehousing, baling and shipping of California's long staple cotton. The project is of benefit to farmers and pickers in the State and is scheduled to pay for itself in 20 years.

Custer State Park Board in South Dakota applied for aid in building a State-operated hotel in the Black Hills to replace one that had been destroyed by fire. The new three-story hostelry is now being used by tourists visiting Sylvan Lake near Mount Rushmore.

Not all of these miscellaneous projects have been income

producing in themselves but most of them not only have been regarded as socially valuable, but have a definite and vital influence on local economic conditions. Tourist trade, for example, has been fostered by the construction of boardwalks at Long Beach, N. Y., and Cape May, N. J.

The long and interesting list of enterprises undertaken by communities shows America at work during the depression on undertakings for the common good. The list includes warehouses, shops, abattoirs, markets, farm buildings, oyster hatcheries, bird farms, bandshells, fences, refrigerator plants, and dozens of others. PWA was deluged with applications for this type of project, many of them proposed by over-enthusiastic private promoters who in instances had conceived the idea of letting Uncle Sam hazard the taxpayers money in speculative ventures. Only a few were able to meet PWA's rigid requirements. In all, these miscellaneous projects, though interesting, amounted to only 1 percent of the total PWA program.

(For a summary of PWA non-Federal allotments for city and town halls, courthouses, auditoriums, armories, and other Government buildings and miscellaneous structures, see table 14 in the appendix.)



WILLIAMSBURG HOUSES IN NEW YORK, THE MOST COMPREHENSIVE SLUM-CLEARANCE AND LOW-RENT HOUSING PROJECT IN THE UNITED STATES, WHICH PROVIDES HOMES FOR 1,622 FAMILIES IN LOW-WAGE GROUPS. THIS PROJECT SUPPLANTED ONE OF THE MOST BLIGHTED SLUM AREAS IN BROOKLYN

A M E R I C A B U I L D S

Chapter XVI

Public Housing



A TRIP downtown for the young ladies of Peachtree Street, Atlanta, had one discouraging aspect. To get from their homes in that noted sector to the shopping district by the quickest route they had to pass a slum. Its gray, dilapidated shanties, with back yards full of trash, lay adjacent to the campus of the Georgia Institute of Technology, at the doorway of downtown Atlanta.

It was a notorious area. On the books of the police precinct, on the rolls of the fire department, in the dossiers of social workers, in the files of the chamber of commerce, the district was docketed as Atlanta's Problem Area No. 1. To the health department it was a source of potential epidemic. To the police it was an area in which officers walked in pairs, and which weekly yielded arrests far out of proportion in their number to the size of the area. Periodically the fire department, after heavy rains, would be called to send

trucks and men to carry inhabitants out of flooded shanties.

It was a low-lying, ugly collection of buildings and junk piles. Its houses were fantastic. Rotting boards hung precariously by single nails; sheets of tin covered up holes in the walls. Plumbing was out of doors. It was a blight on the city and the blight was not static—it was moving glacierlike toward high-priced business property, carrying depression of values along with it steadily and surely.

That was in 1933. By the end of 1936 the young ladies of Peachtree Street could have rubbed their eyes in amazement to see what had happened to Atlanta's prize slum. The shacks and swampy yards had vanished, giving way to trim brick apartment buildings and group houses with clean-cut lines, set amid pleasant green lawns.

Within the buildings were bright, comfortable, and airy apartments and homes. Sensibly arranged, simple quarters were occupied by tenants who formerly had lived under overcrowded, insanitary conditions. There was good equipment in the kitchens, and the basements contained central laundries and clean, dry storage space.

For here stood Techwood, built by PWA, the first public slum clearance and low-rent housing project in the history of the United States. It was the first product of the long campaign to start slum clearance in America on a worthwhile scale and to provide decent public housing for people with low incomes. It was the forerunner of many other housing projects, the bellwether of a movement that suddenly was to make sweeping progress in a comparatively short period.

PIONEERING IN HOUSING

No program of the PWA, with the possible exception of the power program, aroused more controversy than did its housing activities. Yet no other phase of its work enabled one branch of social progress in America to take such amazing strides. Within 3 short years more was accomplished by PWA to establish good public housing for the underprivileged in the United States than had been brought about in the preceding three centuries.

While the enlistment of the Federal Government with towns and cities to provide public works was a new theory, nevertheless the type of public improvements in general were familiar things. But in the field of housing, PWA brought forth something new in the nature of public works. Before PWA appeared on the scene, there was no such thing as a federally aided public housing project to be found in the United States. Housing, for better or for worse, was a matter left to private enterprise and philanthropy. This, despite the arduous labors of the pioneers whose work with city plans and zoning ordinances opened the public mind toward good housing.

PWA was placed in the field of public housing through 17 words in the 6,000-word National Industrial Recovery Act of 1933. Those words authorized the Administrator to include in his program the "construction, alteration, or repair under public regulation or control of low-cost housing and slum-clearance projects." These few, simple words contained the kernel of the idea which bloomed into America's first housing program. PWA's housing activities cost only a fragment of the \$3,300,000,000 appropriated by the Recovery Act. But when PWA turned its housing program over to the United States Housing Authority in November of 1937, public housing was a going concern. Fifty-one large-scale projects¹ either were occupied or were being made ready for tenants; 29 States had passed laws authorizing their cities to engage in public-housing enterprises, and others were preparing to enact similar legislation. Sentiment for public housing was growing like a snowball on a hill, and a public-housing policy had been adopted as the law of the land.

LIMITED-DIVIDEND HOUSING

The first decision of PWA in regard to exercising the authority of the housing provision in the act was that private enterprise should be given a chance to do everything it could. It laid down a policy that it would advance loans at 4 per-

¹ See table 15 in appendix for complete list of PWA housing projects. All of these have been transferred to the U. S. Housing Authority.

cent to private sponsors who would form "limited dividend" housing corporations to erect and operate projects. The sponsors were to put up at least 15 percent of the necessary capital and limit their profits to 6 percent on their own investment.

Results of this policy were not impressive. Only 7 projects out of the more than 500 submitted were approved. Their rents were above the economic reach of slum families, and without exception the projects were erected on vacant land, thereby clearing no slums. PWA recognized as a fundamental principle that slums should be cleared and that the rents of any new replacement housing should be at levels slum-dwelling families could afford. For that reason it was decided that PWA itself would erect housing in those cities which requested it.

OBJECTIVES

The impelling need for some program to deal with the growing slum problem in the United States could not be evaded.

The poison of slums was infecting nearly every city in the Nation although the physical structure varied with localities and customs. In Memphis and New Orleans there had developed "arks"—long, two-story structures with 16 or more Negro families living on each floor, each family having a single room entered from a balcony hanging miraculously to the side of the building. In Philadelphia there had evolved the notorious "bandbox" or "highhat" houses—three small rooms arranged vertically, with a narrow, spiral stairway in one corner. If there were any exposure, it usually occurred on a narrow, frequently crowded, alley. In New York, half a million people continued to live in old-law tenements. In San Antonio, Mexican workers huddled in "corrals," long low buildings with single rooms inhabited by whole families. In Chicago, the storied Loop was surrounded by concentric rings of dingy buildings many of which dated from the great fire.

It was the object of PWA's Housing Division to clear out as many of these slum areas as practicable and to replace them with substantial housing. Obviously, with the small amount of money at its disposal, the Housing Division could not attempt to do a thorough job of ridding American cities of all their slums. It was therefore decided that as many of the worst sections as possible be eliminated and new projects erected in their place, on the theory that if the idea was good, it would grow of its own accord. As it proved, PWA was to demonstrate the value and feasibility of public housing.

Three fundamental considerations dictated the type of new housing to be constructed. These were the health, comfort and safety of the families who were to live in the new projects. It was determined that in order to assure sunlight and air, buildings would cover only a small portion of the total site; that durable fireproof construction should be employed throughout; and that although living quarters in the buildings should be simple, they should be carefully arranged to allow for privacy and reasonable comfort.

First projects to go ahead were in Atlanta, because a group of civic leaders there early interested the Housing Division in two projects. Cleveland, a housing-minded municipality, sponsored three developments. Other projects were formulated for Cincinnati, Ohio; Indianapolis, Ind.; and Montgomery, Ala. Purchase of the slum properties was started, and was carried out by direct negotiation or by condemnation proceedings—friendly and otherwise.

Techwood homes in Atlanta was typical of early Housing Division projects. On 25 acres of land, 23 buildings containing 604 living units in apartments and group houses were erected. They cover one-fifth of the site and are of brick and concrete construction in a modified Georgian style of architecture. Living units consist of three-, four- and five-room apartments and five- and six-room group houses, equipped with electric lights, electric cooking ranges, and mechanical refrigeration. The development includes social rooms and central laundries. Contract for the demolition of the existing structures was signed in December 1934.

OBSTACLES IN THE WAY

The Housing Division pushed a difficult construction program through a swarm of obstacles. Real-estate interests who felt the Government was intruding in a field where exclusive rights belonged to private enterprise instigated opposition. Owners of slum properties who had been extracting inordinate returns from their rookeries saw their chance to continue such operations imperiled. Professional obstructionists, who deplored the slums in one breath inveighed in another against Federal action to put housing reforms into effect. Housing advocates whose particular theories as to design and site treatment were not being followed took to their pens to heap the program with lofty contempt. Practical-minded individuals who wanted to stop the program took to the courts and in the famous Louisville case won a decision that the Federal Government had no right to make use of eminent domain to acquire land for local housing projects, on the ground that housing projects did not serve a public purpose in its fullest sense. Setbacks also developed in Washington where the necessity for shifting recovery funds to sectors where they could be put to immediate relief uses caused budget difficulties. Despite its handicaps, the program moved forward. Projects were approved and put under way in Birmingham, Atlantic City, Charleston, Buffalo, and in more than a score of other cities.

GOVERNING PRINCIPLES

To plan a city with a population of between 70,000 and 80,000 is no small task. Such a city would compare in size with Winston-Salem, N. C., or Little Rock, Ark. In essence this was the problem faced by PWA, but in many ways the problem was more complex than planning merely one community. The Housing Division proposed to operate in many cities. The living habits of prospective tenants varied considerably, and geographical conditions, which had a direct effect on types of construction, differed greatly. While these facts were recognized, at the same time a govern-

ing principle of erecting "the complete community" was adopted.

The development of neighborhoods—rather than individual homes—was accepted as a guide not only for the stability it would give to communities, but also because of the reduced municipal expenditures it could bring about. It was possible to junk the old system of "gridiron" street patterns which largely had been determined by adherence to the long, narrow individual lot. In its 51 projects, the Housing Division was able to remodel existing street patterns and to reduce the necessary street area as much as 30 percent. Similar reductions applied to the residential area of New York, for instance, could cut the annual cost of its street department by several million dollars.

Another benefit to be derived from planned neighborhoods, the Housing Division showed, was the reduction in fire risk. Slum areas repeatedly have proved to be tinder boxes—kindling for a conflagration. Safe housing, carefully planned, removed actual fire hazards in many projects.

ECONOMIC LOSSES OF BAD HOUSING

It was noted early by the Housing Division that in addition to the moral and health menace of the slum, bad housing areas were costing cities excessive amounts for normal city services. The cost of supplying these services by far exceeded the return slum properties paid in taxes. One survey in Cleveland placed the cost of municipal services in a small slum area at \$1,357,000 annually and its yield at \$225,000 in tax returns. It thus left a deficit of \$1,132,000 for the rest of the taxpayers to meet. In Indianapolis, 10 percent of the population, living within certain well-defined areas, was draining 26 percent of the funds set aside for public service. While families living in good housing areas in Indianapolis required a per capita expenditure of \$4 for city services, the families living under bad conditions absorbed \$27.29.

Obviously, the police protection, fire prevention, and health costs of a city would be diminished in a neighborhood where

good housing replaced bad. To this extent, the planned neighborhoods erected by PWA brought relief to strained municipal budgets.

Because of the size of the developments some economies stemming from large-scale operations were possible. In size, the projects ran all the way from the 50-unit Highland Homes at Wayne, Pa., with an allotment of \$344,000 to the huge 1,622-unit Williamsburg Houses in New York City, the Nation's largest, which received an allotment of \$13,459,000.

LAND PRICES

One of the Housing Division's thorniest problems was that of land costs. In many cases slums were near business areas and were held by their owners in the hope of eventual business or industrial value. In some of these areas rentals brought large returns compared to the actual value of the property. For these reasons the prices asked by owners were sometimes extravagantly high and it was necessary to enter condemnation suits to obtain clear titles to property at something approaching true value. After the Louisville case, however, the Housing Division, unable to condemn, began buying vacant sites. Since such areas were usually under one ownership, they could be obtained with greater speed.

All told, the price paid for land ranged from as high as \$4.30 a square foot, in the case of the 25-acre tract for Williamsburg houses in the heart of the Brooklyn slum area, to four-tenths of a cent in Miami. The average price was 44 cents per square foot. The average appraised value of the 51 sites was \$451,430, while the price paid was \$393,341.

COMPARATIVE COSTS

As the program approached completion, oppositionists who feared a spread of the public-housing theory sought every means possible to hamper and embarrass the program. Charges of waste and extravagance were thrown about with complete abandon on the theory that if enough mud were thrown, someone would be hit. Invidious comparisons sprang up like the flowers in spring. Total costs of projects,

including street paving, utilities, outdoor lighting, and land cost were divided by the number of living units and the resulting figure was compared with the mere construction cost of private residences.

In the midst of this situation the Bureau of Labor Statistics of the United States Department of Labor, undertook a survey of public-housing costs. It published its findings in May of 1938 and disclosed that the average construction cost of the dwelling facilities in the public projects was \$4,126. This figure did not take into account the land costs nor other project costs—such as the street utilities, sewers, and lighting equipment for grounds. The dwelling-facility figure, the Bureau declared, was the only fair comparative-cost figure, for, it said, it was the same measure used by it for reporting private-building costs throughout the United States.

Thirty-three projects, 17 southern and 16 northern, were surveyed by the Bureau. The average construction cost per room in the 33 projects, the Bureau found, was \$1,169. Previous charges had put this particular cost as high as \$4,000. The Bureau stated that if it had included extraneous costs, such as sewers, paving, electrical distribution systems outside of buildings, social and recreational space, rentable office buildings, and the like, the total construction cost per room would be \$1,235. Variation occurred between costs of northern and southern projects, the average for the former being \$4,472 per dwelling unit and for the latter \$3,568 per dwelling unit.

RENTALS AND MANAGEMENT

Operation of 51 projects meant the management of rental properties accommodating 21,800 families. It involved the selection of tenant families who could not afford to keep themselves decently housed without public aid. The division set up qualifications based upon prospective tenants' income and their current housing conditions. Families having an income more than five times the rent of the necessary dwelling unit in the public project were excluded. Families who could support themselves in decent housing automatically were refused

consideration. But if the income of a family was within the range permitted, and if the housing in which they lived was considered bad housing; that is, if it failed to meet reasonable requirements in the matter of health, safety, and comfort, the family was considered for residence in the new housing.

As rents were calculated to return 55 percent of the cost of the project amortized over 60 years, plus maintenance and operation costs, the rental figures varied according to the cost of the project. Forty-five percent of the construction price of each project was written off as a PWA grant. The rental was made up of two items: The base rent, or that necessary to return the capitalized construction cost; and a utilities charge. The latter covered cost of heat and light, power or gas for cooking, hot and cold water, and refrigeration. The average base rent ran around \$5.37 per room per month, plus anywhere from 50 cents to \$2.95 per room per month for utilities, depending on local costs for electricity, gas, coal, and the like.

Rental charges on a group of projects were as follows:

City and project	Base rent per room per month	Utilities per room per month	Total rent per room per month
Atlanta, Techwood.....	\$5.52	\$1.81	\$7.33
Memphis, Dixie Homes.....	4.61	1.17	5.78
Stamford, Fairfield Court.....	5.82	2.95	8.77
Birmingham, Smithfield Court.....	4.50	.50	5.00
Cleveland, Outhwaite.....	4.78	1.80	6.58
Indianapolis, Lockefield.....	4.43	2.13	6.56
Montgomery, Patterson Courts.....	3.79	(1)	3.79
Miami, Liberty Square.....	4.99	(1)	4.99
Charleston, Meeting St.....	4.93	.96	5.89
Boston, Old Harbor.....	4.93	1.82	6.75
New York, Williamsburg.....	7.12	1.40	8.52
Philadelphia, Hill Creek.....	5.08	2.17	7.25
Washington, Langston.....	5.40	2.05	7.45

¹ Purchased by tenant.

It was generally conceded, and first by the Housing Division, that these rents were not as low as they ought to be to take care of the families who needed help most. But under the terms of the legislation, through which the Housing

Division was forced to operate, they were as low as was possible. Therefore, PWA advocated a liberalizing of the law.

LEGISLATIVE ADVANCES

Under its own law and because of lack of proper local laws it had been necessary for PWA itself to acquire sites, construct, and operate housing projects. It was early recognized that the cause of public housing would be greatly advanced if communities with Federal aid in the form of grants and loans could perform their own work. In response to public demand, legislation was passed in State after State and city after city permitting the establishment of housing authorities. In 1937 the Wagner-Steagall Act establishing the United States Housing Authority was passed.

Under this act, the basis for subsidy of the projects was vastly expanded; the Federal Government was allowed to make loans and pay subsidies to local housing authorities who would erect projects and operate them themselves. The program in general was "localized" or decentralized.

The enthusiasm which mustered behind the Wagner-Steagall Act was a tribute to the strength of the public-housing movement which had been given form and substance by PWA. The needs that public housing filled, the purpose it served, and its specific accomplishments so appealed to the Nation and to the Congress that the program was deemed worthy of being established as a permanent Government activity. After a 4-year period of demonstration and pioneering, public housing was adopted as a law of the land. Housing had come of age.

A M E R I C A B U I L D S

Chapter XVII.

Summary



TO EVALUATE the work of PWA in terms of its full effect on the economic life of the American people is an almost impossible task at the present time. PWA can claim currently only that it has proceeded to carry out its functions with all the sincerity and ability at its command. Its task has not been carried out without some mistakes and errors, but that was inherent in so huge an undertaking, and especially when the public works program has grown and developed in accordance with the exigencies of the times.

PWA has not been a construction agency, although it might have become so in large part under the provisions of the National Industrial Recovery Act. The only works

which PWA itself has sponsored, contracted, and built were the low-rental housing projects (and these, like all its other projects, were generally constructed under contract). PWA has functioned chiefly by making allotments to the various Federal agencies; making loans and grants to State and other public bodies; and making loans without grants (for a brief time) to certain private corporations, such as the railroads.

The agency, born of the depression, had a tremendous task even in its organization. The vast amount of work involved in administration was not accomplished by rubbing a magic lamp. In the absence of a nucleus organization, it was necessary to draft personnel, to establish procedures, to formulate criteria for the selection of projects and to develop techniques for the handling of many phases of the work in as short a time as possible.

Because of the very nature of the American system of government, the public works program depended largely on the cooperation of the States and their subdivisions with the Federal Government. The legal questions involved in such cooperation were both numerous and complex. Debt limits, tax limits, budgeting, the letting of construction contracts, the employment of labor, and standards of construction were subject to State and local laws, which were not designed to insure the speed with which it was necessary to function. Such legal impediments mainly have been removed by local legislation in the drafting of which PWA has cooperated by request with State and municipal officials.

In the absence of any comprehensive program of planned public works at the start, it was necessary also to stimulate interest, to undertake surveys, to draw plans and designs, and to overcome financial and other difficulties. In the meantime—while communities throughout the Nation were readying themselves for participation in the program—the unemployed and the breadlines were still in evidence everywhere. A part of the PWA funds was therefore set aside in the fall of 1933 for the Civil Works Administration to be used for direct employment of men on relief, to fill the gap until a construction program of any great size could get under way.

But in 1934 the first PWA program began to have its major impact on the construction and related manufacturing industries. The industries which were most affected were those which always are subject to widest fluctuation. In the case of the cement industry, for example, PWA material orders amounted to a ratio of between 50 and 75 percent of the entire output of cement for that year. How many individual plants in that industry were saved from bankruptcy, it is impossible to know. In other industries also, PWA orders constituted what was equivalent to a large proportion of the entire output.

ECONOMIC EFFECTS

The effect of PWA on industry is further indicated by the fact that with the rapid completion of projects in early 1935 there began a turn-down in production indices. But at this time there was already in existence an organization geared to work at high speed. Legal difficulties had, in large part, been swept away, and local officials, having become used to PWA methods, were anxious to take advantage of Federal aid. Thus, when the Emergency Relief Appropriation Act of 1935 was passed, construction was put under way in a much shorter time. There followed immediate and sharp upturn in production indices.¹ It is fair to attribute a substantial share of this increase to PWA material purchases and employment.

Through 1936 and 1937 Congress made no direct appropriation from the Treasury to provide PWA with funds except to authorize it to use up to \$359,000,000 from the revolving fund. It was hoped that private enterprise would pick up as the public construction program slowed down, but in the spring of 1938 it became all too evident that this was not the case. Something had to be done to counteract the business recession. PWA was there. It was reduced to a skeleton, to be sure, but it was grounded in the fundamentals and techniques of public-works administration and how to

¹ The Federal Reserve Board index of industrial production stood at 87 in April 1935, the month in which the ERA Act of 1935 was passed. The index thereafter rose rapidly to reach 101 by December 1935 (1923-25 average=100).

get a program under way with no loss of time. It also possessed a reservoir of thousands of eligible projects, planned by communities all over the country, for which funds had not been available theretofore.

With the passage of the PWA Act of 1938, the agency made allotments almost overnight. Although the act was not signed until June 21, with the best construction season almost half over in many localities, the program was put under way immediately. Within a few weeks, contracts were let by the hundreds, and thousands of men were put to work on the sites of construction and in the factories receiving material orders for the projects. The requirements, which Congress made in the law, that all projects be put under construction by January 1, 1939, was met.

Not all the communities which applied for PWA assistance in building or improving local works could be aided, due to the fact that the funds provided PWA by Congress were insufficient to care for all requests. As a result, PWA once again has been able to build up a reservoir of worthy projects.

COMMUNITIES' NEEDS

The requests from communities throughout the Nation, as well as independent surveys, show clearly that local needs for public improvements, contributions to education, public health, sanitation, adequate water supply, better transportation facilities, and a higher standard of life generally are far from fulfilled.

All these needs which must be ultimately met can be more adequately and properly fulfilled by proper planning. Such advance planning is, of course, essential if public works are definitely utilized as a national policy to combat economic depression and to stabilize business fluctuations.

PWA has shown that a Nation-wide construction program of large size can accomplish this objective for it not only puts hundreds of thousands of men to work on the sites of projects, but more than twice as many in the factories and in the mines and transportation industries, all in accordance with the normal American method of working through the channels

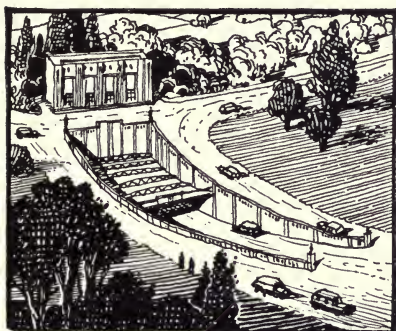
of private enterprise. With a well-trained supervisory organization and rigid insistence on the highest standards of honesty and fair dealing, inefficiency and graft can be eliminated from public works and the communities and labor and employers can share in the benefits. Furthermore, opportunities are created for the safe employment of savings in matching the Federal Government's contribution toward the financing of the projects. It has been the basic objective of PWA to stimulate recovery by increasing purchasing power, by increasing the real wealth of the country, by providing employment in the field and in the factory, and by drawing private capital into productive use.

PWA is not and never has aimed to be a direct relief organization. There are thousands whom it can never affect directly and for whom other aid has to be provided. It can and does, however, through its activities, keep hundreds of thousands of men off the relief rolls and can be in a position to step in when the heavy construction industry lags to influence national income and to help bring about national economic recovery.

A M E R I C A B U I L D S

Chapter XVIII

Case Histories



IN EVERY section of the United States there have been constructed PWA projects which are noteworthy because of their spectacular engineering features or because of the social purposes which they have been intended to fulfill. These public works of more than usual interest range in size from small projects costing but a few thousand dollars to ones costing many millions. The following 10 projects, located in different sections of the country and exemplifying a variety of types, have been selected at random to illustrate the enduring service which PWA projects render.

New York—A Bridge

In the 1880's, human spiders began spinning the steel webs of bridges joining together two score cities and villages on half a dozen islands and peninsulas that were to grow into Greater New York City. In 1883 that great engineering triumph, the Brooklyn Bridge, was finished, and in a third of a century three more bridges followed, bringing even closer the segments of a great metropolitan area.

By 1916 traffic over these bridges had reached 11,500,000 vehicles per year and began to choke the city. A group of engineers suggested a bridge to connect the fast growing Bronx, Queens, and northern Manhattan sections of the city. Nothing was done. By 1925 East River traffic grew to 55,000,000 vehicles. Still, nothing was done. By the end of the 1920's traffic had reached 83,000,000 vehicles and conditions were intolerable.

This brought matters to a head and the city brought forward new plans, proposing a Triborough Bridge—an immense new artery of travel, connecting three of the five boroughs, its “feelers” reaching out to the suburban communities of the city.

Work on Triborough Bridge was begun on October 25, 1929. That was the day the headlines in the papers read: “12,800,000-share Day Swamps Market — Most Disastrous Decline — Five Bankers Say Conditions Are Sound.” Few people noticed the little story about the start of the new bridge.

For 3 years the city struggled to build the new bridge in the face of the avalanche. Then, in 1932, with \$5,000,000 spent, the city had to give up.

In 1933, after PWA was created, the city regained hope. A new bridge authority was organized and application was made to the PWA for a loan and grant. Engineering and financial experts of the authority and PWA discussed the

matter. After consultation, engineers lopped an unnecessary second deck off the plans. Thousands of cubic yards of expensive granite facings were cut off the 1½-mile viaduct that soared over two islands. The towers were simplified. Without affecting usefulness \$10,000,000 was saved, later to be invested in even better connections. A working plan emerged, something solid, substantial, and utilitarian.

PWA made a grant of \$9,200,000 and a loan of \$35,000,000 and work resumed December 12, 1933. PWA funds began to flow—to provide employment—and to stimulate industry.

Contractors at once called for cement, steel, and lumber. Up on the Maine coast, along the Hudson and Mississippi Rivers, the great cement factories donned their white-dust plume that signified “working full shifts”, for Triborough used a half a million cubic yards of concrete. The whistles in half a hundred Pennsylvania factories recalled workers to their tasks at the hearths and mills. On the Pacific coast great trees crashed and were started on their way to make forms. Thousands of men along the various railroads began rolling and shifting the cars of girders, cables, and plates destined for the project.

Through the hard winter of 1934-35 and through the hot summer engineers labored over drafting boards to keep ahead of the growing army of workmen, so that the steel ends of the bridge reaching out from land on three sides might make their rendezvous over Wards Island. Huge amounts of employment were created at the site and in the Nation’s factories. Lawyers, clerks, stenographers, and other white-collar workers labored to acquire the land for the 13 miles of approaches, and to keep check on the progress of the work.

The project made light of obstacles in its path. City blocks vanished. Narrow streets widened as if a titanic wedge were hammered through between their confining house walls. Creeks surrendered to concrete arches.

In one part, the sea bottom was compelled to yield up a new embankment. In another part a vast blighted neighborhood of gas houses and oil storage tanks were doomed to make way for a new highway.



TRIBOROUGH BRIDGE, NEW YORK

The deadline was getting closer. The bridge had to open in July 1936. Men, men, and more men were added to the pay rolls. Two hundred separate trades, all the way from asbestos and asphalt workers to upholsterers and wire-stringers, worked on the project for their accustomed wages.

Five thousand men worked three shifts a day. Through the spring the crescendo increased. The last thousands went to work at 6 a. m. the morning of July 11, 1936, to clean up.

At noon that day, President Roosevelt, Administrator Ickes, Commissioner Moses, and the Triborough Bridge Authority marched onto the bridge. Scissors flashed. A strip of shimmering silk fluttered—and the champing motorcade it held in check moved. Triborough Bridge was marked on PWA records as a completed project.

Triborough Bridge is a gigantic traffic machine, a huge 17-mile Y with one arm on the mainland and two others on Long Island and Manhattan. It has four overwater crossings, the most conspicuous being the Hell Gate suspension span, but some of the others, dwarfed beside it, are the largest of their type in the world. It includes a lift bridge, a low-level bridge, a long trestle between Wards and Randalls Islands, many highway and parkway bridges along the connecting water-front parks; parkways in three boroughs, a flying junction at Randalls Island where 14 lanes of traffic moving in eight directions meet and pass without interruption. And best of all, it provides 17 miles of high-speed travel in the midst of a city, with only one stop, to pay toll.

Triborough Bridge was financed by PWA on the basis that it would be a self-liquidating project. What have been the results?

The turnstiles started to click; the first original optimistic estimate set traffic at 9,900,000 vehicles; actually 11,642,949 crossed during the first full year (1937). The next year again showed an excess over expectations.

The bankers who would not take those bonds at any price in 1933 when PWA stepped in, were later glad to pay a

premium for them, and the Federal Government made a million and half dollars profit to be used on new work-producing projects.

But Triborough yielded other benefits also. The city acquired a new park on Randalls Island. A stadium there was used for Olympic try-outs the day the bridge opened. Another park is in the making on Wards Island.

While Triborough was building, a committee, searching for a site for a great world's fair, looked over the situation in Queens. They found that the Queens connection for the bridge ran by a huge garbage dump which for years had been a rat-infested waste. Part of the Triborough plan was to reclaim this dump for a park, for with the completion of the bridge that dump would be 1 hour closer to the center of the city. That dump has become Flushing Meadow Park and on that park, aided by the Triborough Bridge, has risen the New York World's Fair of 1939. (The other main connection with the fair is the PWA-financed subway which runs across the south end of the park.)

To the north the city's great North Beach Airport is being put into final shape, because the construction of the Triborough Bridge has brought the flats of North Beach only 30 minutes away from the heart of Manhattan.

The bridge which opened up these developments also produced a real-estate boom in northern Queens.

The Triborough Bridge repaid PWA's confidence by becoming one of the best-paying public facilities in the land. So great has its success been that on the basis of its income the Triborough Bridge Authority was able to construct a new bridge—the Whitestone Bridge—farther north.

Summary of data

APPLICANT: TRI-BOROUGH BRIDGE AUTHORITY,
NEW YORK, N. Y.

Loan.....	\$35,000,000
Grant.....	\$9,200,000
Actual cost.....	\$44,291,290
PWA work started, March 12, 1934.	
Bridge opened for traffic, July 11, 1936.	

Construction fully completed, May 7, 1937.

Man-hours (on site)-----	7,717,000
Man-hours (off site), estimated-----	24,000,000
Total man-hours, estimated-----	31,717,000
Wages (on site)-----	\$8,392,000
Value of material orders-----	\$17,460,000
Origin of material orders (135 cities)-----	20 States
Expected traffic for 1938 (vehicles)-----	9,900,000
Actual traffic for 1938 (vehicles)-----	11,619,344
Expected income from traffic for 1938-----	\$2,579,000
Actual total receipts for 1938-----	\$2,950,970

CASE No. 2

Texas—A Harbor

In Brownsville, Tex., they built a port for ocean-going ships in the middle of a prairie.

Brownsville is located near the extreme southern tip of Texas, on a prairie 18 miles from the Gulf of Mexico. The story of its rise is also the story of the magic valley of the Rio Grande and of citizens with imagination enough to plan far ahead.

Many years ago the Rio Grande River was not only a border line between the two countries, but an artery of commerce. French and English vessels anchored near its mouth, lightered their cargoes to the Mexican town of Bagdad, located at the river's mouth, and from Bagdad the cargoes were taken upstream in small boats. Gradually, however, the river filled with silt and even the small amount of commerce on the river became impossible. But the citizens of south Texas never forgot the benefits of water-borne transportation.

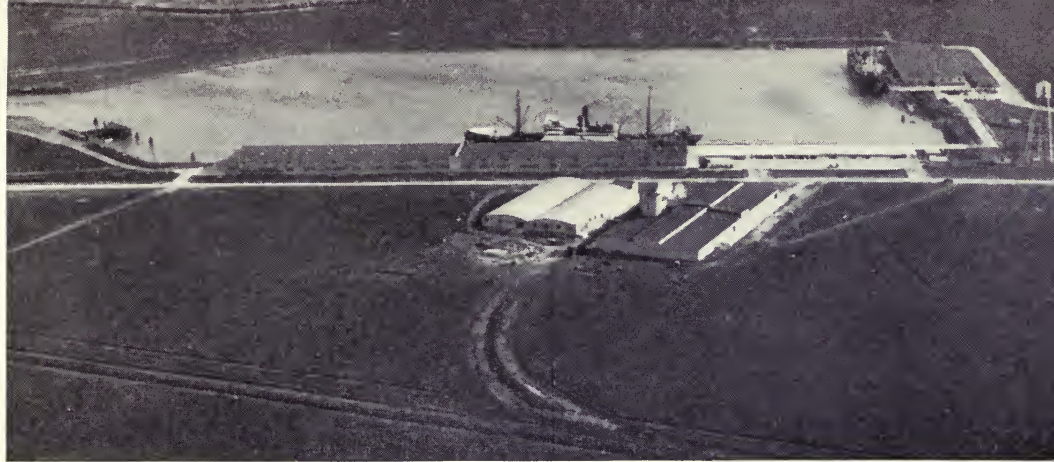
At the beginning of the present century some easterners visiting the Rio Grande Valley visualized the marvels which might be wrought by irrigation. Soon small areas had water canals and began producing vegetables and cotton with prodigal abundance. Still later grapefruit and orange trees were planted.

Now 800,000 Rio Grande Valley acres are under irrigation. The valley has become one of the world's largest producers of fine citrus fruits. It is the site of some of the most extensive truck farms in the world with fields of carrots, spinach, broccoli, and peppers so broad that it is impossible to see across them even though they are planted on almost flat ground. Throughout the valley packing and canning and byproduct plants are located, shipping their produce to every corner of the Nation and particularly to the great markets of the East.

Brownsville, as the valley's most important city, was concerned with the transportation problems involved in moving a vast quantity of produce to market quickly and economically. Old citizens had not forgotten the days when the Rio Grande had been a waterway, and water transportation was uppermost in their minds. They began to make plans for making a port out of Brownsville, a port through which would flow not only citrus fruits, vegetables, and cotton, but oil and the metallic ores of Mexico.

Today Brownsville, though inland, has one of the busiest and fastest-growing ports on the Gulf. The port was built through the cooperation of the people of the area, the War Department, and the PWA. A special navigation district was set up by local citizens under State authority. The War Department had funds for river and harbor improvements which could be used to dig a canal within 7 miles of Brownsville. The canal was planned to be wide enough and deep enough to permit the passage of many large ships. At the end of the canal a turning basin, the size of three city blocks by four city blocks, was to be placed. Then the navigation district turned to the Public Works Administration.

PWA made an allotment of \$2,835,982 for the building of warehouses, docks, and other improvements at the turning basin. Built with PWA funds also were three large warehouses, two long wharves, and an oil dock. Included in the project were funds to build a water line and a power line to connect the port with utilities at Brownsville.



THE TURNING BASIN OF BROWNSVILLE, TEX., HARBOR—THE HARBOR
BUILT IN THE MIDDLE OF A PRAIRIE

After the PWA allotment had been secured and work started, the Texas State Highway Department built a concrete highway from the city to the port and a railroad built an extension to the docks.

Completion of the project was the signal for immediate industrial development. A cotton-compress company saw the advantages of the new port and built warehouses. Recently a number of major oil companies have established tank farms at the port, and leases have been made for a truck storage and distribution plant to handle molasses, a precooling and cold storage plant, and a petroleum products plant.

The port's tonnage has increased steadily since the first cargo moved out of its warehouses to a waiting freighter. Tonnage handled has approximately doubled each year. In 1936, about 39,000 tons were handled; in 1937, over 54,000 tons; in 1938, more than 105,000 tons; and in the first 3 months of 1939 more than the entire amount handled in 1937. Eight steamship lines now make Brownsville a regular port of call. Cargo of all sorts is shipped to every part of the world.

The future is still brighter. Under way now in Willacy County, Tex., is a huge irrigation project, also financed by the PWA, which will add still more to the valley's production capacity. And, too, oil has been discovered nearby and may further increase the tonnage of the "port in the prairie."

Summary of data

APPLICANT: BROWNSVILLE NAVIGATION DISTRICT

Loan.....	\$2,120,013
Grant.....	\$715,969
Estimated cost.....	\$2,835,445
Started, December 1, 1934.	
Completed, August 21, 1937.	
Man-hours (on site).....	351,701
Man-hours (off site).....	707,900
Total man-hours.....	1,059,601
Wages (on site).....	\$218,779
Value of material orders.....	\$599,139
Origin of material orders (States).....	17

CASE No 3

Illinois—A Sewerage System

The trouble with Chicago was that it grew too fast. It started out as a little frontier post on the banks of a mile-long sluggish stream that meandered through the marshes to Lake Michigan. But through the nineteenth century and the first decades of the twentieth, Chicago's growth was phenomenal. The city began to spread; before it realized, Chicago was faced with a sewage problem.

Faced was a literal term, for in its early days Chicago dumped its sewage into the lake at its front door. This same lake provided its water supply.

In 1900, in a burst of decorum and resentment stirred by a rising number of deaths from water-borne disease, Chicago dug a canal reversing the flow of the Chicago River, and used the lake water to flush its sewage down past numerous towns along the Illinois and Mississippi Rivers. Having turned its back on the problem the city promptly forgot about it.

The resulting uproar from the adjacent and nearby States was instantaneous, loud, and sustained. Cities along the Great Lakes claimed that the water diverted from the lake lowered water levels and interfered with navigation. The towns along the Illinois and Mississippi Rivers were dismayed

to find Chicago's sewage flowing past their property. These cities brought charges, and conflicting opinions were aired at length and with considerable emotion through the courts, until finally, in 1930, the United States Supreme Court decided that the lake diversion must be cut to 1,500 feet per second by the end of 1939.

The sanitary district of Chicago was thus faced with a \$129,000,000 bill for constructing a new sewerage system, and 8 short years in which to complete it. Work was started, but the area, hard hit by the depression, and looted by succeeding generations of politicians, was financially strapped, and was unable to continue the job. Construction on the project came to a standstill.

In the closing days of 1933, an appeal was made to PWA. The Government engineers went over the proposed plans and an allotment of \$8,000,000, which included a grant based on 30 percent of labor and materials, was approved. Later, allotments brought the total up to \$59,351,487 which increased the loan to \$41,863,040 and the grant to \$16,950,000.

PWA made this loan when bankers refused to purchase the bonds. The sanitary district was having much trouble with its tax situation, its bonds were in default and quoted at a substantial discount. Nevertheless, PWA bought these bonds at par, or \$100. It later, however, resold them to bankers at \$101, and made a profit of \$419,380 on the \$41,938,000 bond issue.

Work started January 2, 1934. Since that time the greatest sewerage system in the world has grown under the watchful eyes of the PWA engineers.

A new lock and control works costing \$3,000,000 has been built where the lake flows into the river, for with the tiny legal flow, a rainstorm would reverse the flow and send the cities' sewage coursing into the drinking-water supply. This part of the project provided a 600- by 80-foot lock for ships. Behind this lock are the great miter gates that permit the river to flow in but swing shut to prevent its reversing.

The next problem was to collect all the sewage that was



THE LARGEST SEWERAGE PROJECT IN THE WORLD, UNDERTAKEN WITH PWA ASSISTANCE, IN CHICAGO, ILL., TO SERVE A GREAT METROPOLITAN AREA. UPPER PHOTO—THE SOUTH SIDE DISPOSAL AND TREATMENT PLANT. LOWER PHOTO SHOWS HUMAN ANTS WHO BURROWED UNDER GROUND TO BUILD A VAST NETWORK OF SEWERS

formerly dumped raw into the river. The work started with laying of 3-foot pipes under the myriad streets cross-hatching Chicago and 49 other nearby cities and towns.

This system of street laterals empties into larger and deeper tubes, ending up in the great interceptors. Far below street level, these interceptors are concrete-lined tunnels, 19 feet high by 18 feet wide, approximately the size of subway tubes. Constructed over a period of 15 years by burrowing humans, they serve to carry millions of gallons of waste every day to the treatment plants.

The largest of these disposal plants is the southwest side treatment plant, double the size of any other treatment plant in the world, serving an area of 192 square miles, a million and a half people and industrial wastes equivalent to a population of another million people. The plant cost \$15,000,000 and covers 500 acres.

Here the solids are removed from 400 million gallons of sewage a day. The purified water is returned to the river. Vacuum filters dry the solids, which are burned under the boilers that provide power. The ash is caught by the huge battery of Cottrell precipitators, which snares the dust in a tangle of electrons and prevents 100 tons of solids a day from being scattered over the surrounding prairies. Since some of the dry sludge has value as fertilizer it is sold, and coal to operate the plant is bought with the profit.

It is impossible to flow all the sewage to the southwest side plant, so another plant costing \$5,275,000 was built in Calumet to serve the huge industrial area south of Chicago close to the Indiana State line. Additions were made to the old plants at the north and west sides involving a cost of \$2,000,000.

The Chicago sewage system is one of the greatest engineering feats completed with PWA funds. It will safeguard the health of millions of citizens in the heart of the Nation. It has created a work of permanent value for years to come. And it was built at a time when Chicago's citizens were most in need of the millions of man-hours of work it provided.

Summary of data

APPLICANT: SANITARY DISTRICT OF CHICAGO

Loan.....	\$41,863,040
Grant.....	\$16,950,000
Estimated cost.....	\$59,351,487
Started, January 1, 1934.	
To be completed, August 31, 1939.	
Man-hours (on site).....	17,152,697
Man-hours (off site).....	28,271,000
Total man-hours.....	45,423,697
Wages (on site).....	\$19,537,463
Value of material orders.....	\$21,326,259
Origin of material orders (States).....	14

CASE No. 4

Missouri—An Auditorium

Atlantic City, Miami, and San Francisco have long known what tourist trade meant in terms of cold cash. They found out early and began capitalizing on it, but it took Kansas City a long time to decide to lure tourists.

Kansas City, an early day "cowtown" and trail head for the West, has none of Atlantic City's nor Miami's salt sea air, nor the climate of San Francisco. It has one advantage, however, that none of these other cities has: It is built where the Kaw meets the Missouri, very nearly in the center of the United States.

Kansas City discovered that when a group of people want to get together they usually do it at a point convenient to them all. It became convention conscious. But if you want conventions you have to provide a place for them to meet.

In the last years of the nineteenth century Kansas City built its first great convention hall. In 1900, because it had a hall big enough, it got the Democratic National Convention. In the midst of plans for the biggest meeting in the Midwest's history the hall caught fire and burned down. Within 3 months, in time for the convention's first meeting on the



THE 6-MILLION-DOLLAR AUDITORIUM IN KANSAS CITY, MO., BUILT TO ACCOMMODATE 40,000 PEOPLE. THE BUILDING CONTAINS ASSEMBLY SPACE FOR LARGE CONVENTIONS, CONCERTS, MEETINGS, LECTURES, AND THEATRICAL PLAYS AS WELL AS OTHER ACTIVITIES.

Fourth of July, Kansas City had a new hall ready, a hall which would seat 20,000 people.

For 36 years Convention Hall was a center of Kansas City life and it was the scene as well of thousands of meetings, great and small. But the growth of the city and the demand for more and varied types of assembly space made a new building necessary. Citizens got together, planned a new auditorium, and included its construction in what they called their 10-year plan for civic improvement.

As the plans took shape it became evident that Kansas City, because of reduced revenues due to depression, could not finance its \$6,000,000 project, even though materials were cheaper and men in the building trades were clamoring for work. As soon as PWA was organized, however, Kansas City applied for a grant of \$1,290,000 to add to its own funds. A few months after the allotment was made, actual work started and 2 years later the city completed what is said to be the most beautiful convention hall in the world.

This modern "town hall" is, of course, more than an auditorium. In reality it is a group of related assembly spaces:

The largest of these is the arena, which can seat 15,000—useful for sports and exhibitions as well as very large conventions; next largest is the music hall, seating 3,000, used for concerts, meetings, and lectures; a little theater, with capacity for an audience of 1,000; and 32 other rooms, with accommodations for from 25 to 500 people.

The Kansas City auditorium is not only the second largest in the United States, but it is the most modern. It covers an entire block in the heart of the city, rising to the height of a 10-story building. Because of careful planning by acoustical engineers every room in the building may be used without disturbing what is going on elsewhere—crowds may cheer an ice-hockey game wildly in the arena without interfering with a concert of chamber music in the music hall.

Forty thousand people may attend various events in the auditorium at one time and yet the building has been so planned that in case of emergency all 40,000 could be on the streets in 8 minutes.

From a base of polished granite, the rough-cut buff limestone walls rise to their heights, relieved of severity by carved-stone medallions and friezes. The vast expanse of exterior walls is unbroken by windows, this plan eliminating all traffic noises and aiding in positive control of lighting and air conditioning by artificial means. Air conditioning is provided by the third largest plant so far constructed, installed at a cost of \$1,000,000.

Many engineering perplexities were conquered in the design and construction. The problem of supporting a roof and ceiling over the large arena without the employment of interior supports was solved by the use of 226-foot traverse trusses, fabricated of silicon steel and weighing 240 tons each.

Since the auditorium was placed in service businessmen in Kansas City have counted many extra dollars brought to town by convention delegates. Along with this it has served as a center for the cultural and recreational life both of Kansas City and a wide surrounding area. The auditorium has already been the gathering place of outstanding national conventions. Not only socially and economically useful, the

auditorium meets PWA's requirements of permanency. It will be one of the great meeting places of the Nation for many years to come.

The inscription on the cornerstone reads: "Laid November 29, 1934, by the will of the people, which is the cornerstone of all good government."

Summary of data

APPLICANT: CITY OF KANSAS CITY

Grant.....	\$1,290,000
Estimated cost.....	\$6,261,469
Started, June 5, 1934.	
Completed, July 28, 1936.	
Man-hours (on site).....	1,171,510
Man-hours (off site).....	2,959,700
Total man-hours.....	4,131,210
Wages (on site).....	\$1,131,274
Value of material orders.....	\$2,350,938
Origin of material orders (States).....	18

CASE No. 5

Florida—A Bridge-Highway System

Key West is a part of the United States mainland again. Behind that simple statement is the story of one of the hardest fights any city ever had to wage, the dramatic tale of how a city, doomed to become a ghost town of crumbling and forgotten masonry, battled for its very existence and won. Once cut off from the mainland by a hurricane, it is now connected by one of the most spectacular bridge-highway systems in the world.

Key West, the southernmost city of the United States, built on an island of coral set in the Gulf of Mexico, has known ups and downs before. Long ago it became a harbor for pirates who stopped to fill casks with the fresh sweet waters of the only spring on the Florida keys. Henry Morgan and Black Caesar stalked its lanes. A thousand pirates drank and cursed in its bordellos, sold and swapped stolen goods in its market place.

With piracy wiped from the high seas, Key West became



THE HIGHWAY THAT GOES TO THE SEA. A PORTION OF THE MOTOR ROAD BUILT ON OLD RAILWAY BRIDGES IN SOUTHERN FLORIDA. THE BRIDGE-HIGHWAY SYSTEM CONNECTS KEY WEST WITH THE MAINLAND

the chief operating place of men who made a living by the simple expedient of looting ships they had wrecked by changing navigation markers.

In 1822 the United States Navy cleaned up Key West. A naval base was established, providing the little city with almost its first legitimate trade. As cigar makers from Cuba moved in the city grew, and at one time its rich Havana cigars were famous the world over.

Key West reached the zenith of its prosperity during the Spanish-American War. Naval and military operations out of Key West brought thousands of ready purchasers to the city, and trade boomed.

Later connected with the mainland by a railroad which ran over a series of 11 bridges from key to key, and served by regular ship lines to Tampa and Havana, Key West had ready access to the markets of the world. But conditions changed. Cigar manufacturers began moving to the mainland to be nearer their markets. As factories left, workers

either went with them or remained without employment. By 1935 a large percentage of the population of Key West was receiving Federal relief money.

Key West has weathered many hurricanes. It was excited but not dismayed when in 1935 ominous storm warnings once more appeared. But this hurricane was different. The winds were more furious than ever before. The sea waves rose to tremendous heights. Key West itself was spared, but its life line was gone! The railroad bed on the keys was washed away. The rails were twisted; communication, except by water, was cut off.

Key West then began its long uphill job of rehabilitation. When the railroad announced that it would abandon its line, some of the citizens almost lost hope. But, said the railroad, if anybody wanted to buy the right-of-way, it was willing to sell. Engineers put their heads together and announced that it would be possible to convert the railway causeway into a highway if money could only be found.

The money was found. PWA, organized to meet just such situations, lent \$3,600,000 to a special-tax district set-up to buy and operate the new causeway. Plans were rushed and hundreds of men who needed jobs were soon busy at work turning the railway into a 20-foot wide, hard-surfaced road 34 miles long.

The new road system swings south and eastward from the extreme tip of Florida through the sparkling waters of the Gulf, the waves of the Atlantic beating on one side and waters of the Straits of Florida on the other. It loops from key to key, jumping over water gaps on converted railroad bridges, including one 7 miles long, held to be the longest bridge in the world entirely over water. At the Bahia Honda Bridge, the highway soars over the top truss spans, 60 feet above the water. Trains crossed this particular bridge at grade level, but because of the narrow space of 14 feet which was sufficient for trains but insufficient for a highway, the roadway has been lifted to the top of the girders, far above the former rails. Completion of the system is regarded as an outstanding engineering accomplishment.

Without the railway, Key West had only ferry service to the mainland. By auto or bus and ferry one could make the trip in a full day—sometimes in longer time if the ferry got stuck on a sand bar. The trip cost \$3.

Today a motorist can reach Key West from the mainland, a distance of 145 miles, in less than 4 hours, soaring across the beautiful waters. The cost of the trip is a dollar for the car, and a quarter for each passenger.

And today business at Key West is looking up. Hours closer to Miami and Tampa, tourists are beginning to flock to the city at the southernmost end of the United States. In the first 9 months of operation, the new highway bridge system was used by 108,000 vehicles carrying 195,000 passengers. Now citizens of Key West work hopefully to increase their tourist industry, seeing in it a means toward economic self-support.

Summary of data

APPLICANT: OVERSEAS ROAD AND TOLL-BRIDGE DISTRICT (MONROE COUNTY)

Loan.....	\$3,600,000
Estimated cost.....	\$3,600,000
Started, November 30, 1936.	
Completed, September 21, 1938.	
Opened full length, March 29, 1938.	
Man-hours (on site).....	1,464,890
Man-hours (off site).....	1,526,400
Total man-hours.....	2,991,890
Wages (on site).....	\$781,116
Value of material orders.....	\$1,011,471
Origin of material orders (States, primarily Florida).....	13

CASE No. 6

California—A School Program

At 5:54 p. m., on March 10, 1933, the people of Los Angeles, Long Beach, and other southern California cities and towns suddenly began to feel the ground sway beneath their feet.



BEFORE AND AFTER. THE OLD HUNTINGTON PARK HIGH SCHOOL (TOP PHOTO) IN SOUTHERN CALIFORNIA, AS IT LOOKED IN 1933 BEFORE IT BURNED FOLLOWING A GAS EXPLOSION. THE BUILDING WAS COMPLETELY DESTROYED (MIDDLE PHOTO). THE NEW SCHOOL (BOTTOM PHOTO), LIKE HUNDREDS OF OTHERS IN THE LOS ANGELES AREA WAS BUILT TO WITHSTAND EARTHQUAKES

In a little while, however, it was over. The earth, with a few resigning sighs, returned to its normal complacency. Once the early surprise and shock was over, the people turned to their usual pursuits, but municipal officials were left with a building reconstruction problem on their hands.

No city was ever built as was Los Angeles. Founded in 1781, it had only 1,200 population 50 years later. General Fremont came in 1846 and raised the Stars and Stripes but Los Angeles remained the sleepy Mexican pueblo it had been. Then finally the railroads sent their shining tracks westward and southward and things began to happen.

In 1909 Los Angeles began to split its chrysalis. It absorbed most of its smaller neighbors. It reached out 30 miles to the sea and became one of the Nation's great ports. It finally included 441 square miles within its borders.

Such rapid growth, unequalled by that of any other city in the history of the world, brought along problems such as no other city has ever had to face. And one of those great problems was that of building a school system capable of constant expansion.

At the time of the earthquake in 1933 the schools of Los Angeles included every type of building, many of which had been hurriedly constructed without too much regard for permanency and safety. The metropolitan Los Angeles area had been a promoter's dream. Subdivision after subdivision had increased its size. In some of them, schools were built to attract residents before houses were constructed. In addition, numbers of towns and cities had been merged with the city of Los Angeles and each of these had its own system of schools, separately planned and built.

Schools were not in session when the earthquake rumbled through the Los Angeles area in 1933. But what if they had been? At Long Beach every school had crumpled under the strain or had been made unsafe for use. All through the area cracks showed in walls, once believed secure—foundations were torn apart. Another earthquake and the buildings that withstood the first might fall, and the people of Los Angeles had nearly 240,000 children in those schools.

The California Legislature acted. It passed a bill requiring all plans for schools to be passed by a State board of architecture, setting up standards of construction which, at that time only, a few schools in the State could meet. The legislation placed definite responsibility on school boards for bringing existing buildings up to earthquake-standard construction.

The city and county of Los Angeles was faced with the problem of rebuilding its entire school system, one of the largest in the country. And this was at a time when business was at a standstill and the cost of such a program appeared to be far greater than the citizens could meet. Then, with the organization of PWA, a bright ray of hope appeared—Federal funds could be used for the double purpose of meeting the school-building crisis and alleviating the economic distress which was then current.

A board of 48 architects, engineers, and construction experts was appointed by the Los Angeles Board of Education. First the board of consultants examined all the school buildings to determine which were not fit for reoccupancy. Sixty masonry structures were immediately removed from use. After further study the board made its recommendations as to replacements and improvements. Then in earnest began the largest school building and rehabilitation program ever undertaken.

For nearly 3 years the sound of hammers could be heard in every section of Los Angeles County as workmen tore down buildings marked unsafe and as others went up in their places. Architects and engineers busied themselves with thousands of blueprints and drawings. On project sites the sign "Skilled Workmen Wanted" went up. Contractors ordered additional equipment. Solidly built schools rapidly began to replace the tents, bungalows, and temporary shelters that were set aside for the children.

The result—536 buildings rehabilitated or constructed. The cost—\$34,144,000, of which the PWA furnished loans and grants totaling \$18,424,727.

Today the Los Angeles area has one of the Nation's most

modern systems of schools, built for today's needs, and moreover, built to withstand earth shocks greater than those experienced in the past. It is hoped that the schools of Los Angeles and other cities in the country may never need the extra margin of safety built into them.

Summary of data

APPLICANTS: BOARD OF EDUCATION, CITY OF LOS ANGELES
SCHOOL BOARD, LOS ANGELES COUNTY

Loan.....	\$5,347,000
Grant.....	\$13,077,727
Estimated cost.....	\$34,144,063
Started, August 7, 1934.	
Completed, April 27, 1938.	
Man-hours (on site).....	11,388,743
Man-hours (off site).....	15,419,000
Total man-hours.....	26,807,743
Wages (on site).....	\$10,547,198
Value of material orders.....	\$11,942,418
Origin of material orders (States).....	17

CASE No. 7

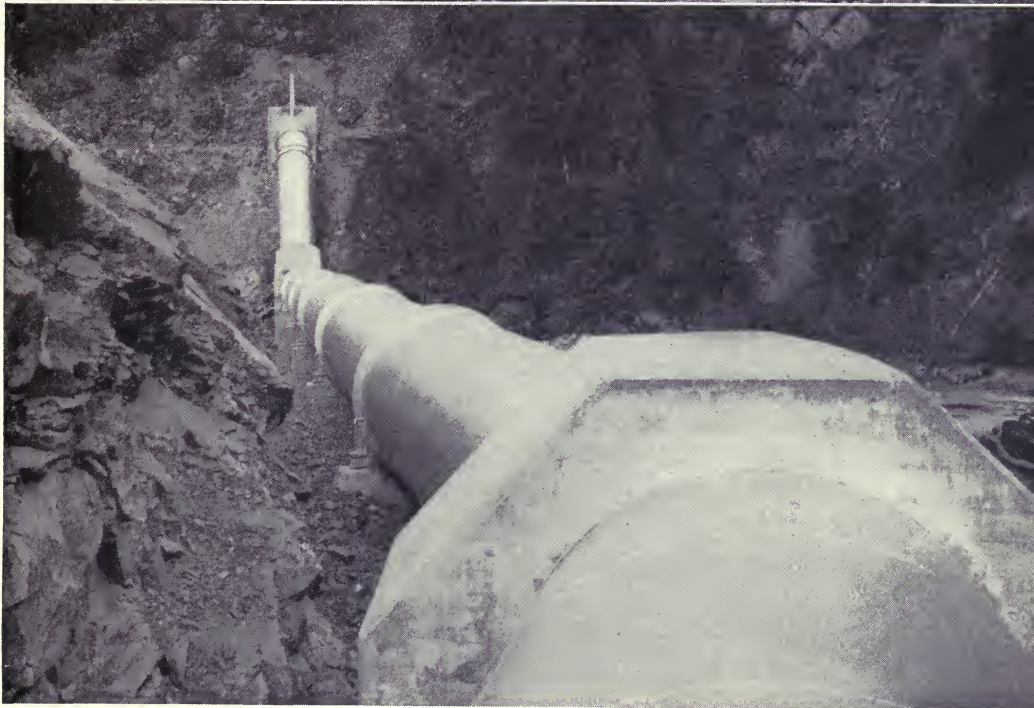
Colorado—A Water Supply System

The average yearly rainfall at Atlanta is 48 inches; at New York it is 43; at St. Louis, 37. But at Denver it is only 14.

Scarcity of rainfall in itself is enough to create a water supply problem but this was not the only problem at Denver. Since water rights in the semi-arid Mountain States are held for beneficial use on a first come, first served, basis, Denver's rights to the waters of the South Platte River were subject to prior rights of users for irrigation. Every year in the early part of this century, Denver's population was going up and its water supply was falling below the ordinary needs.

Denver now has solved its water-supply problem.

The story begins in 1917 when Denver bought out the private company which had been supplying the city with water.



TWO VIEWS OF THE SPECTACULAR DENVER WATER SUPPLY PROJECT, FAMILIARLY KNOWN AS THE MOFFAT TUNNEL PROJECT. UPPER PHOTO SHOWS STILLING BASIN AND CONCRETE-LINED CHUTE AT INTAKE TO RALSTON RESERVOIR. THIS WATER FROM THE WESTERN SLOPE HAS JUST DESCENDED THROUGH A HUGE CONCRETE BOX CHUTE AND IS BEING CALMED IN THE STILLING BASIN BEFORE FLOWING ON TOWARD RALSTON DAM. LOWER PHOTO SHOWS III-1/2-INCH SIPHON NO. 1 IN SOUTH BOULDER CANYON, PART OF THE SOUTH BOULDER DIVERSION CONDUIT

Shortly after the purchase, the city found that water in Lake Cheesman, the main reservoir, was rapidly diminishing. Then began plans for the spectacular water-development program which was to follow.

To the west of Denver the Rockies rise. On the western slope the melting snows feed the Colorado with clear, pure water. If Denver could reach across the mountains and obtain water from those snows its problem would be solved.

The Denver area also had a transportation problem on its hands. Railroad traffic was forced to cross the mountains at Rollins Pass at an elevation of more than 11,000 feet. The steep grades made the passage slow and difficult. Engineers made plans which not only would eliminate dangerous grades and cut miles from the railroad's crossing the Continental Divide, but which also would provide an eventual solution for the Denver water-supply problem.

After surveys were made in 1920 and 1921, the Colorado Legislature set up a Moffat Tunnel District for the purpose of issuing bonds to finance the boring of a tunnel 6 miles long through the mountains. So as to speed up construction of the tunnel, a pilot tunnel 75 feet from the main tunnel, was first cut through the mountain in order that men could work on the main tunnel in many places at once rather than merely at both ends. The pilot tunnel, the engineers said, could later be used to bring water from the western to the eastern slope.

On completion of the great Moffat railroad tunnel, the city of Denver leased the smaller pilot tunnel and began a few improvements with the hope that some day funds would be available to put it in condition for use as a water conduit.

Then came the most serious drought known since the settlement of Colorado and the demand for water rose to unprecedented peaks. The reserve water supply of Denver fell to 36,000 acre-feet. Denver was forced to buy water constantly from the holders of irrigation rights.

As the demand for adequate water supply grew, citizens turned hopefully to the tunnel. But no money was available either to recondition the tunnel, or to bring water to its west-

ern mouth, or to pipe it to Denver once it came through the mountains. At that time with business at a standstill, banks were unwilling to put money into such an enterprise.

With the organization of PWA, Denver found a way to meet its needs. PWA had been planned to generate construction of useful projects which otherwise could not be built. Denver had a perfect case. It faced an emergency in relation to its water supply, it faced an equally great emergency in finding useful jobs for many of its citizens, and its industries, like those of the rest of the country, needed the stimulation which would be provided with a large amount of construction. Denver obtained a PWA grant.

The first project Denver set up included plans for collecting water from creeks and rivers over a 100-mile watershed on the western side of the Continental Divide. The water was to be brought by conduits to the western portal of the tunnel, hewn from the solid rock of James Peak, sent under pressure to the apex of the tunnel and flowed into Boulder Creek on the eastern slope by gravity and down 23 miles to a diversion dam and then across the plains through a system of siphons, tunnels, and conduits to Ralston Creek Reservoir. From there it could be diverted to the Denver supply system or allowed to flow into the South Platte River for the use of irrigation districts below Denver.

After work began a second project was added for equipment which would give high-pressure service to pipe the water to the residents. The total cost of the two projects was \$9,567,500 of which PWA provided \$4,006,225.

With the completion of the projects Denver's reserve of stored water steadily rose. It has been estimated that at the end of 1939 the city will have available 220,000 acre-feet of water—enough to meet the needs of the metropolitan area for 2 whole years—and at the same time supply additional water for irrigation below the city.

Summary of data

APPLICANT: BOARD OF WATER COMMISSIONERS (DENVER)

Loan.....	\$450,000
Grant.....	\$3,556,225
Estimated cost.....	\$9,567,500
Started, February 12, 1935.	
Completed, January 15, 1938.	
Man-hours (on site).....	3,105,789
Man-hours (off site).....	4,921,200
Total man-hours.....	8,026,989
Wages (on site).....	\$2,646,587
Value of material orders.....	\$4,242,288
Origin of material orders (States).....	18

CASE No. 8

Washington—University Building

When the black lines on business charts and graphs were generally reaching for the bottom, there was at least one notable exception—the number of students in most of the publicly owned colleges and universities continued to rise.

As the depression set in during the fall of 1929, most educators believed that there would be a corresponding drop in enrollment. There was a decrease in the size of student bodies in a number of the smaller private colleges. But the big State institutions continued to grow. And many of them, including the University of Washington, were unprepared.

There were a number of reasons behind the increase. In the first place the continued development of the secondary school system had made more students eligible for college. In the second place, with few jobs available, many youngsters went to college, or stayed longer, rather than be idle. Most important, parents as well as students felt that in a world in which competition for jobs was growing greater, the college-educated girl or boy seemed to have a better chance for employment.

The University of Washington, like many another institu-

tion, found in 1933 that the buildings which it had erected in the twenties, and before that, were already filled to overflowing. Although registration was rising, nonstudent income was falling off. Thus when the need for expansion became most acute, the financial means for such expansion had fallen to their lowest ebb. Except for the help of the PWA, students might have been turned down entirely, or given training with inadequate facilities and equipment.

The university, established in 1861, had so grown by 1895, that the campus was moved from downtown Seattle to the shores of Lake Washington. By 1900 it had a student body of 1,500. By 1915 the board of regents authorized a "master plan" to insure steady growth and uniformity of design of the physical properties. Over a period of 18 years, from 1915 to 1933, the facilities were increased until 22 buildings in the familiar collegiate Gothic style had been erected. By 1933, however, the enrollment of the university had jumped to 8,500, and classrooms and dormitories were overcrowded.

The University of Washington became in 1933 one of the first institutions of higher learning to apply for a PWA allotment. The first building to be constructed was a \$459,869 wing for the university's cathedral-like library which dominates the campus. The following year additional PWA grants and loans made possible the construction of a group of women's residence halls, an infirmary, and additions to the power plant with a total cost of \$980,000. The dormitories, replacing two which were more than 40 years old, added distinction to the campus with their fourteenth century Tudor manor house design. The new infirmary, with 75 beds, replaced an obsolete structure which had once been used as a barracks. The new power plant, equipped with two steam turbo-generators, was estimated to have saved the university \$2,000 worth a month in the cost of power production.

Shortly after the women's residence halls got under construction workmen began pouring foundations for a \$1,075,000 chemistry-pharmacy building for which PWA had provided \$481,427. The largest building on the campus, it was de-



DORMITORY AT THE UNIVERSITY OF WASHINGTON, SEATTLE. ONE OF SEVEN BUILDINGS CONSTRUCTED ON THE CAMPUS TO ACCOMMODATE THE INCREASED ENROLLMENT

signed to contain classroom and laboratory equipment for 3,000 students. Completion of the building released five other buildings, which had previously been used by the science students, and these were renovated and turned over to other departments of the university.

Because of the proximity of important aviation manufacturing concerns, of the United States naval base at Sand Point, and the Army Air Corps post at McCord Field, interest in aeronautics always has been great in the Northwest. The department of aeronautics, which has within the past few years rapidly become one of the most important in the college of engineering, needed an aeronautics laboratory. The university, with PWA aid, therefore began construction in 1936 of a wind tunnel to test new types of airplanes. The building, consisting of a wind tunnel and testing chamber, and also workshops, classrooms and offices, was completed

the following year at a cost of \$126,160. This structure provided the college with complete facilities for the study of aerodynamics.

The building program was continued in 1937 and 1938 with construction of an indoor swimming pool in a new wing of the physical-education building. The addition, costing \$206,600, afforded students opportunities for swimming instruction and recreation for the first time in the history of the university.

The seven buildings, representing an investment of almost \$2,850,000, made possible a long step forward in the development of the university. The enrollment jumped from 8,748 in 1934, when the first PWA-financed building was constructed, to nearly 11,000 in the fall of 1938.

Summary of data

APPLICANT: UNIVERSITY OF WASHINGTON (SEATTLE)

Loans.....	\$435,000
Grants.....	\$1,006,821
Total estimated cost.....	\$2,847,635
Started, February 7, 1934.	
Completed, September 30, 1938.	
Man-hours (on site).....	759,369
Man-hours (off site).....	1,287,000
Total man-hours.....	2,046,369
Wages (on site).....	\$711,580
Value of material orders.....	\$1,375,691
Origin of material orders (States).....	16

CASE No. 9

Alabama—A Water Supply System

The town of Wilton, in Shelby County, Ala., is typical of many smaller communities which have outgrown the well-and-bucket era, and have installed modern water systems.

Wilton (population 562, according to the 1930 census) is located in the industrial part of the State at the intersection of an important State highway and a mainline railroad. Its residents derive their income principally from the railroad

shops and the nearby Montevallo coal fields. For years these citizens had looked forward to the day when they would no longer have to depend upon wells, cisterns, and rain barrels for their water, and could rely upon a tank and faucet. And now the miracle of running water has come to pass.

In the fall of 1936, the acting mayor of Wilton wrote a letter to PWA in support of the town's application for a waterworks project. He wrote, in part, as follows:

I would like to find out, if there is any possible way, that we might get emergency aid along this line, as our case has grown to be actually an emergency. This dry summer we have had has dried up almost all our water supply—namely, cisterns—and we are right up against it for water. About half the population at the present time is having to haul water, in barrels, which you can see is very unsanitary and unhealthy. We are having a world of sickness here at the present time, caused from nothing else but impure water.

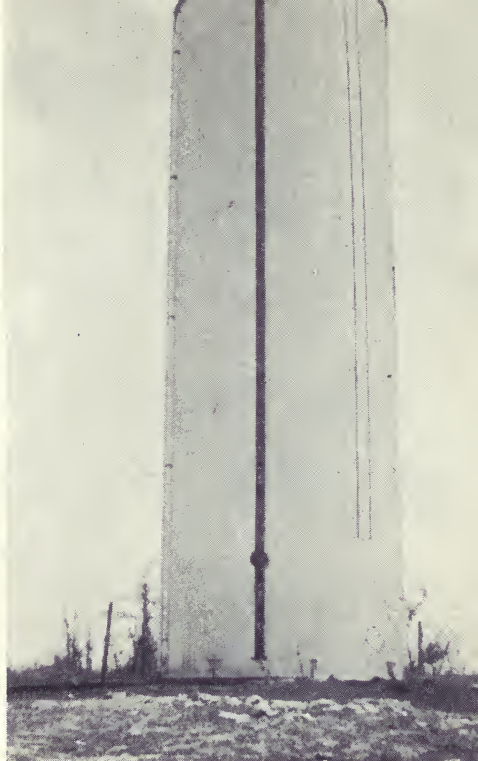
Should the health department visit this place on an inspection of the water conditions, all of our water would be condemned. Then what would we do?

We would have to have some aid.

And for this reason, alone, I think our project one of the most deserving, worth while, projects that has ever made application to the PWA for help. We would gladly issue bonds and put up 55 percent of the project, but revenue bonds are the only kind we could issue, and on investigation we find positively no sale in Alabama for revenue bonds. We are willing to do anything possible to get water. Won't you please help us?

Investigation by the PWA in the field indicated that the picture was not overdrawn. Water had to be carted many miles in the summer. The few private wells which existed, dried up in July. Four houses had burned to the ground within 2 years through lack of water to check the flames. Examiners found the project to be technically and economically sound, and an allotment was made.

Construction started in the winter of 1937, and before spring, 10 weeks less 2 days later, Wilton had a new waterworks system. A natural spring with a minimum daily flow of 150,000 gallons was curbed. Workers built a pump house and installed chlorinating equipment and a 100-gallons per minute centrifugal pump driven by a 7½ horsepower motor. On top of a hill they erected a tall, 100,000-gallon storage



WILTON, ALA., WATERWORKS SHOWING THE NEW 100,000 GALLON STORAGE TANK, WHICH TOGETHER WITH A PUMPING SYSTEM AND OTHER FACILITIES HAS REPLACED THE OLD-FASHIONED, UNRELIABLE WELLS AND STORAGE TANKS

tank, connected with 5,600 feet of cast-iron pipe. They laid an additional 13,800 feet of 2- and 4-inch pipe, and installed service connections and meters to provide the distribution through which the water, by gravity, was to reach the consumers.

No miracle of engineering was performed here, but the results of the improvement have made a lot of difference to the citizenry. Home owners, merchants, garage operators, and school children find their PWA project not only a great convenience, but also a protector against some of the hazards of fire and disease.

Summary of data

APPLICANT: TOWN OF WILTON

Loan.....	\$17,000
Grant.....	\$13,909
Estimated cost.....	\$30,909

Started, January 8, 1937.

Completed, March 17, 1937.

Man-hours (on site)	6,033
Man-hours (off site)	22,700
Total man-hours	28,733
Wages (on site)	\$3,176
Value of material orders	\$17,899
Origin of material orders (States, primarily Alabama)	10

CASE No. 10

Ohio—A Flood-Reduction Project

Ever since the first white settlers located in southeastern Ohio, the Muskingum River and the tributaries with which it drains one-fifth of the total area of that State, have overrun their banks.

Floods frequently have occurred there; small ones often and great ones at longer intervals. Residents early found that communities which, for the most part, were located on waterways for transportation and power advantages were unprotected when flood waters came swirling down upon them.

Thus the Muskingum proper, which is formed by the junction of the Walhonding and the Tuscarawas Rivers and flows south into the Ohio at Marietta, has, together with the tributaries in its 8,000 square-mile drainage area, taken a heavy toll. What efforts were made to cope with the problem proved inadequate. The threat to the lives of 675,000 inhabitants and millions of dollars worth of property was ever present.

In March 1913 there occurred the greatest of these floods on record. Then, angry waters rolled over whole cities and thousands of farm acres. Many lives were imperiled; much property was destroyed. Families were left homeless and without means of livelihood. Cities and counties spent \$3,000,000 to repair roads and bridges alone. Other floods followed.



CONTROL GATES ON THE BOLIVAR DAM, ONE OF 14 DAMS CONSTRUCTED
IN THE MUSKINGUM VALLEY OF OHIO FOR FLOOD REDUCTION

The early settlers had found along the Muskingum a rich, fertile region, and this they put to use. But intensive grazing and cultivation, along with deforestation, contributed to erosion of the land. Much of the rich topsoil was washed away by erosion and floods. The once fertile area came to face serious economic problems.

When the residents went wearily back to their mud-buried homes in 1913 they knew that the rivers and streams had to be shackled if they ever were to live there in safety. Agitation for flood control grew, increasing with each flood.

Legislative pioneering by the Ohio State Legislature brought passage, in 1914, of authority for creation of what were to be known as conservancy districts. Then a State survey led to the conclusion that it would be feasible to plan and execute a comprehensive flood-control and water-conservation program for the entire watershed. But the cost of such a program was greater than local interests could bear.

The Muskingum Watershed Conservancy District, a public

corporation, was organized. A preliminary plan of flood control and conservation was drafted and, in August 1933, the district applied to PWA for financial assistance.

Fourteen dams, including 1 concrete and 13 earth-filled, were to be constructed along the Walhonding and the Tuscarawas Rivers and on Wills Creek, another tributary of the Muskingum. These and the reservoirs thus created were to hold back and store water at their sources. The flow into the Muskingum would be retarded in flood times and increased in low water periods.

The greatest earth-moving process ever undertaken in the East would have to be attempted. The entire region would have to undergo a face-lifting. Many miles of railroad and utility lines of highways would have to be relocated. Some whole villages would have to be moved. The cost of the undertaking was estimated at \$44,000,000.

PWA allotted the project \$22,090,000 as a Federal grant for construction to be undertaken by the United States Army Corps of Engineers. Other grants later increased the amount of Federal participation to \$27,190,000. The State highway commission put up money to relocate highways, the conservancy district agreed to furnish lands and rights-of-way through funds provided by landowners and the State legislature.

The United States Corps of Army Engineers supervised the job of bringing the plan to realization. Before the end of the year, bids had been taken on three dams. Soon work was under way. Men who otherwise would have been unemployed went to work on the construction sites, building the Charles Mill Reservoir on Black Fork, the Piedmont on Stillwater Creek, and the others elsewhere. From the valleys rolled a stream of material orders which meant jobs for other men in mines, mills, and factories.

The Charles Mill Dam was the first completed, being finished in August 1936, and others were ready shortly thereafter.

Within 4 years, all 14 dams, ranging in size up to 6,300 feet long in the case of Bolivar Dam on Sandy Creek and

to 113 feet high in the case of Pleasant Hill on Clear Fork, had been constructed, dams which it was estimated were capable of holding back a maximum of 20,000 million tons of water. Eleven new lakes, with a shore line of more than 200 miles, were created.

To bring the project to completion required such undertakings as the moving of 65 miles of railway, 140 miles of highway, 50 bridges, and enough earth to build a great wall 12 feet high and 6 feet wide a distance equal to that between New York and Chicago.

Along with flood reduction went the offensive against erosion. Here, as in the reservoir construction, was an example of Federal, State, and local cooperation toward a common end, the restoration of the 100- by 140-mile area toward its once fertile, prosperous condition.

The Soil Conservation Service, the Forest Service, the Biological Survey, WPA, CCC, and NYA were among the Federal agencies taking part in the program through which Muskingum became the greatest conservation laboratory in the country.

Extensive control programs were put under way. Reforestation and afforestation began. Wildlife restoration was launched around the new lakes. Recreational developments were started.

Again the chilling alarm of floods spread through Ohio in 1938. Muskingum residents read in their newspapers or heard on their radios the story of advancing waters and accompanying destruction. But Muskingum's inhabitants went about their normal business, concerned about Ohioans elsewhere but knowing that they, themselves, were fairly secure. The violence of riotous floods had been banished from Muskingum. The valley of Muskingum had become "protected valley."

Appendix

What PWA Has Accomplished to March 1, 1939

PWA has allotted funds for public works in 3,069 of the Nation's 3,071 counties for—

15,940 Federal projects under NIRA costing-----		\$1,567,533,029
1,840 Federal projects under PWA 1938 costing-----		199,999,207
51 low-rent housing projects costing ¹ -----		136,669,759
3,734 non-Federal projects under NIRA costing-----		1,309,084,152
3,804 non-Federal projects under ERA 1935 and sup- plemental costing-----		792,878,629
- 1,768 non-Federal projects under FDA 1936 costing--		393,323,050
1,191 non-Federal projects under PWAE 1937 cost- ing -----		261,278,132
6,180 non-Federal projects under PWAA 1938 cost- ing-----		1,425,223,488
<hr/>		
34,508 projects costing-----		6,085,989,446
Projects completed or under construction:		
26,508 projects completed costing-----		3,779,852,280
7,940 projects under construction costing-----		2,291,382,507
Contracts have been awarded on ² —		
	Total cost, percent	
Federal projects under NIRA-----	99.9	1,565,533,029
Federal projects under PWAA 1938-----	98.3	196,699,207
Non-Federal projects under NIRA-----	99.8	1,306,901,952
Non-Federal projects under ERA 1935 and supplemental -----	99.9	792,358,629
Non-Federal projects under FDA 1936-----	99.9	393,159,414
Non-Federal projects under PWAE 1937-----	99.8	260,690,632
Non-Federal projects under PWAA 1938-----	99.9	1,423,895,638
<hr/>		
Total-----	99.8	5,939,238,501
There has been spent on PWA projects:		
For wages-----		1,205,451,900
For materials-----		2,174,833,430
Man-hours of employment provided by expenditures:		
1. At site of construction-----		1,714,797,910
2. Production of raw materials, transportation, and fabrication-----		3,179,000,000

¹ Figures as of November 1, 1937, the date on which these projects were transferred to the Housing Authority.

² Includes force account, but excludes housing projects.

Revenue Bond Laws

The so-called revenue bond laws recently enacted contain certain essential and standard provisions. Among the more prominent and characteristic provisions are the following:

1. A definition of what undertakings may be considered to be classified as revenue producing under the terms of the act and therefore subject to financing on the revenue bond basis contemplated by the statute. Also a definition of the type and character of public corporations which would be eligible to make use of the statute in this manner.

2. The extension of necessary powers to municipalities or other public corporations to permit a maximum use of the authority delegated in the act to such public bodies.

3. The general method and form of authorizing the construction or acquisition of undertakings contemplated in the act, and the financing of the same by the issuance of bonds thereunder.

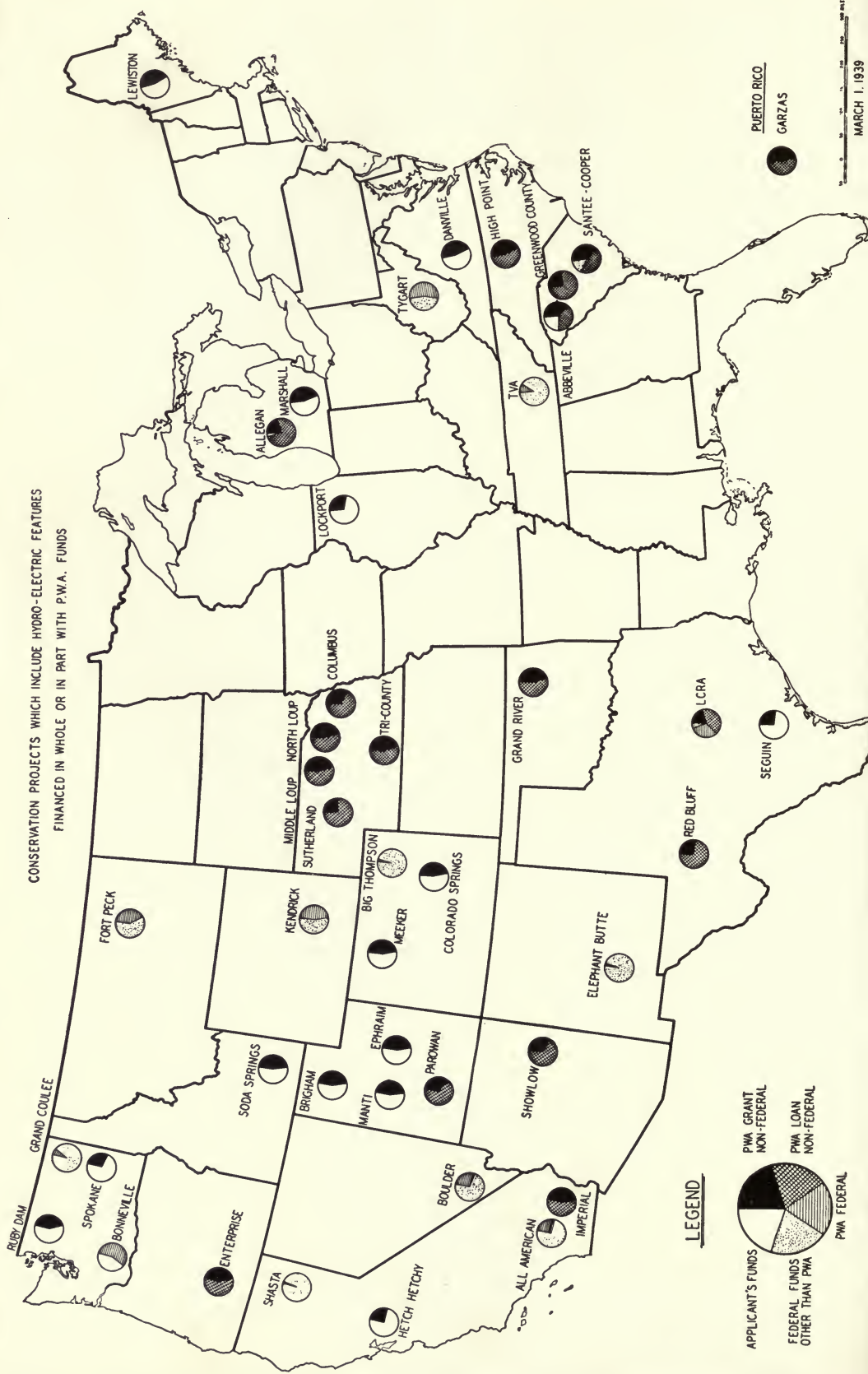
4. The extension of power to make covenants with bondholders in a broad sense in order to effectuate the purposes of the act, especially with respect to the provisions necessary to render the securities offered acceptable from an investment standpoint.

5. A definition of the lien of the securities issued under the statute with respect to existing obligations and to those which may subsequently be authorized to provide for extensions or improvements. Likewise a definition of the responsibility of municipalities with respect to the ultimate repayment of the securities issued. Many statutes give no right to have a foreclosure sale of the properties. The bondholders' remedies are (1) a court order to maintain sufficient rates and (2) the appointment by a court of a receiver to operate so long as interest or principal is in default.

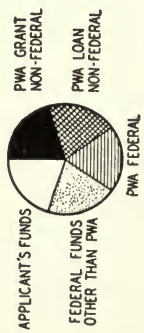
Broad provisions indicating the use to which the revenues of an undertaking may be put, and a declaration of the duties of the municipality acquiring it in respect to the self-supporting features of the project.

Many acts, likewise, provide for the consent and jurisdiction of State and municipal agencies, provisions against competing undertakings, and a description of the extent to which the bonds and the income therefrom may be subject to taxation.

CONSERVATION PROJECTS WHICH INCLUDE HYDRO-ELECTRIC FEATURES
FINANCED IN WHOLE OR IN PART WITH P.W.A. FUNDS

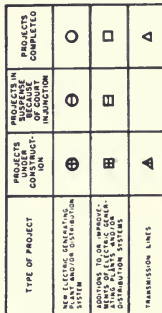


LEGEND



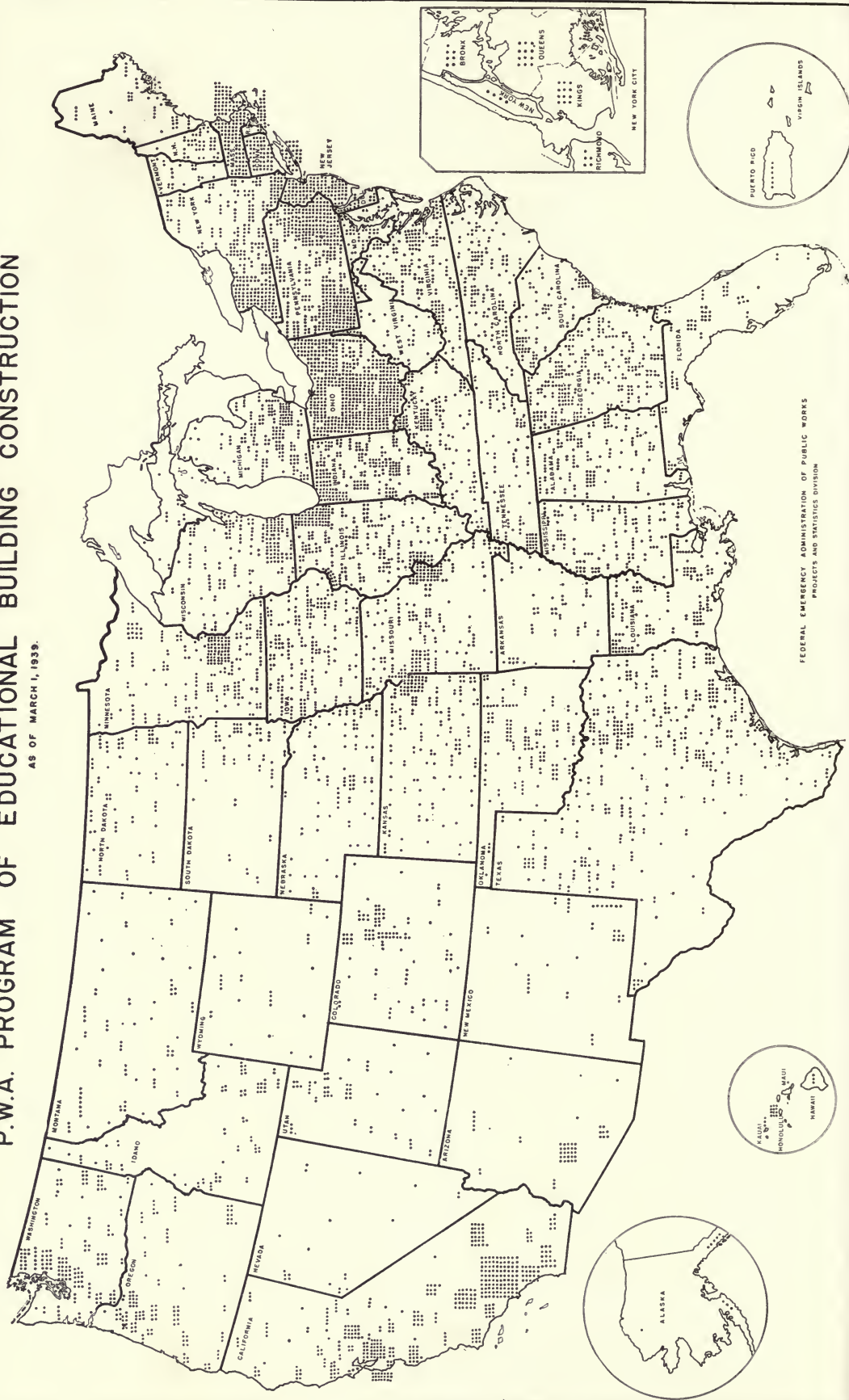
PUERTO RICO
GARZAS

NON - FEDERAL PROGRAMS
AS OF MARCH 1, 1939



P.W.A. PROGRAM OF EDUCATIONAL BUILDING CONSTRUCTION

AS OF MARCH 1, 1939.



FEDERAL EMERGENCY ADMINISTRATION OF PUBLIC WORKS
PROJECTS AND STATISTICS DIVISION

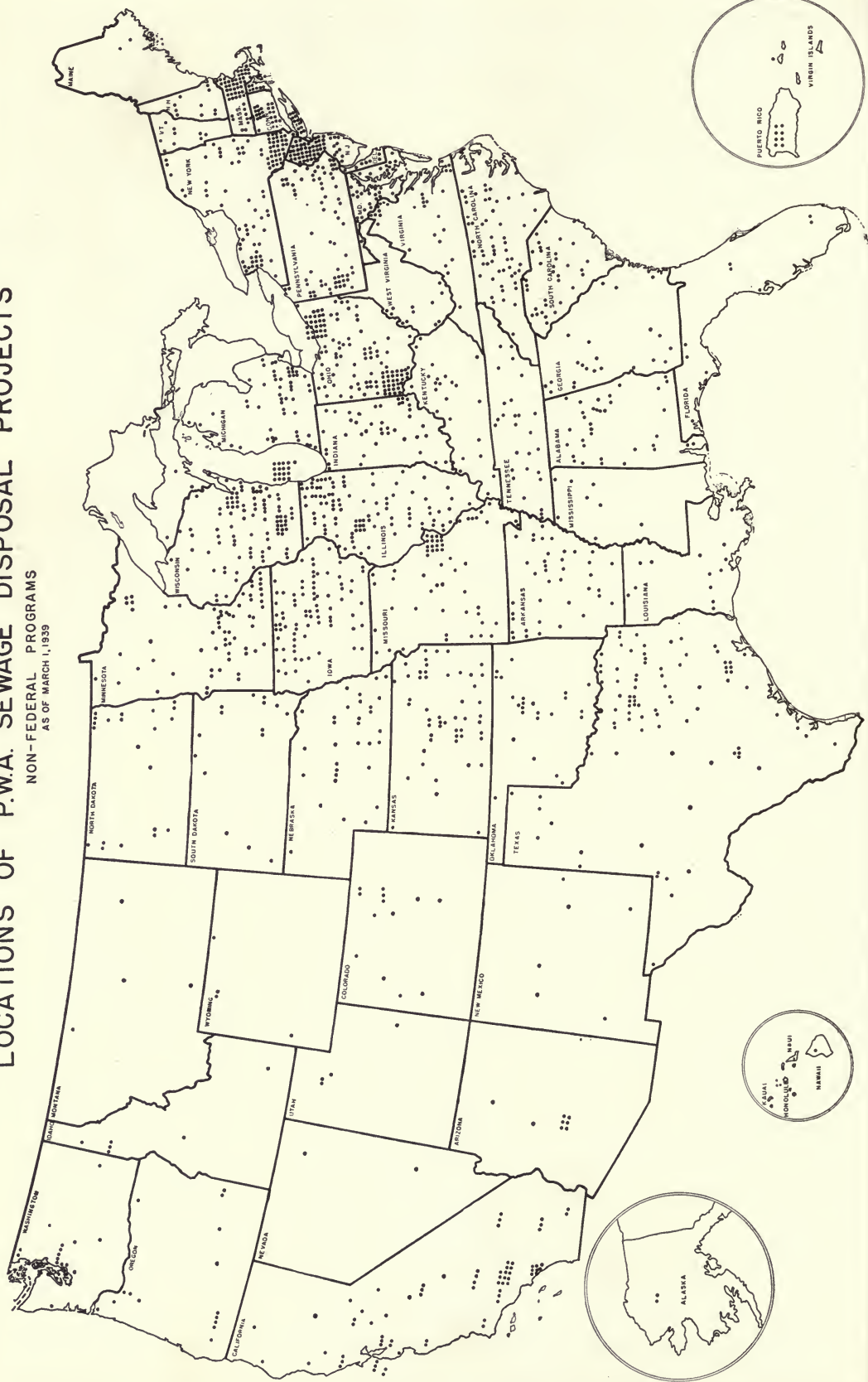
PWA PROGRAM OF NONFEDERAL HOSPITAL CONSTRUCTION

EACH SYMBOL REPRESENTS ONE HOSPITAL OR INSTITUTIONAL GROUP CONSTRUCTED, REPAIRED AND/OR FURNISHED FROM FUNDS PROVIDED BY PWA - AS OF MARCH 1, 1939



LOCATIONS OF P.W.A. SEWAGE DISPOSAL PROJECTS

NON-FEDERAL PROGRAMS
AS OF MARCH 1, 1939



LOCATION OF P.W.A. WATERWORKS PROJECTS

NON-FEDERAL PROGRAMS
AS OF MARCH 1, 1939

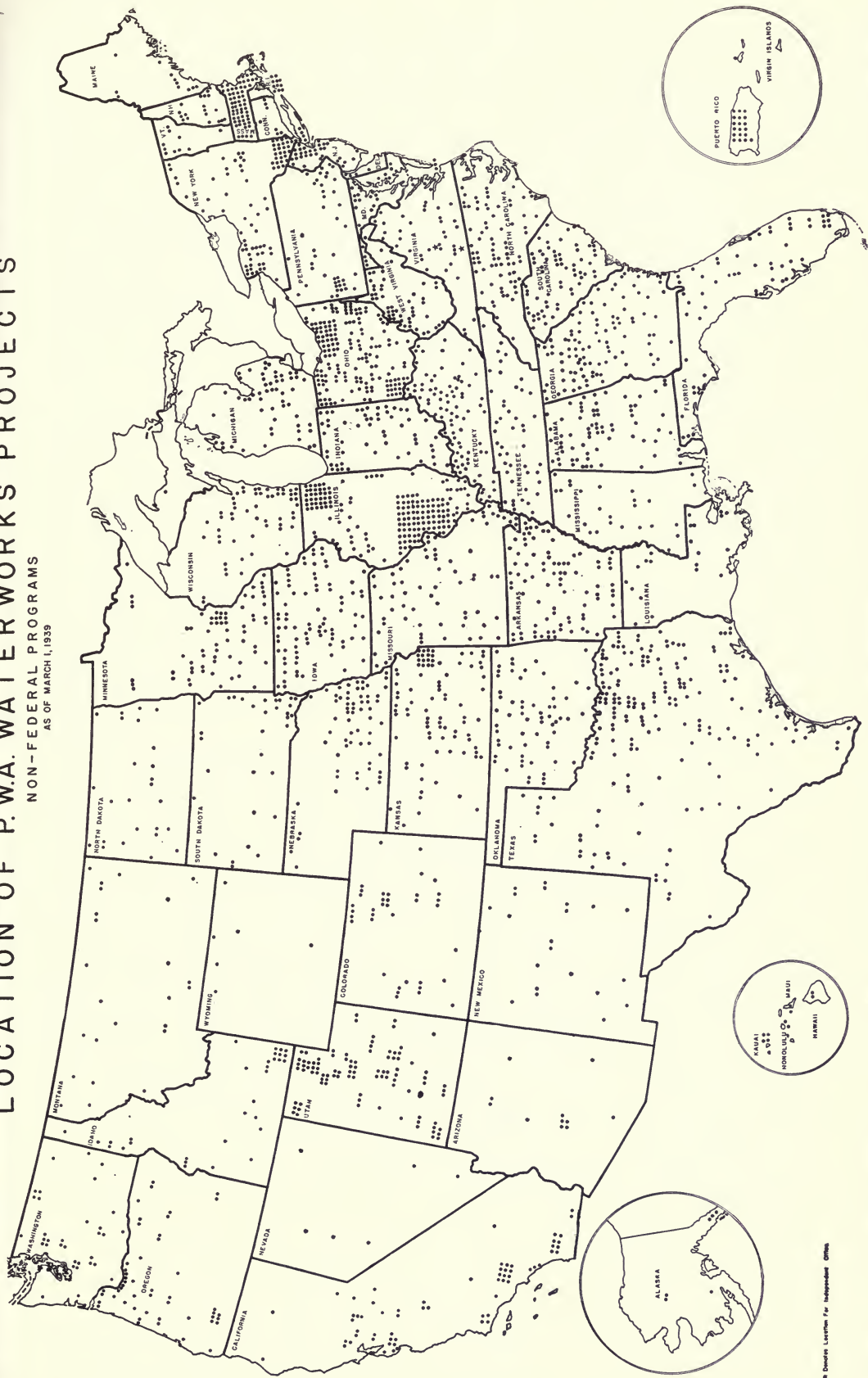


TABLE 1.—*Status report of all appropriations*
[As of Mar. 1, 1939]

Allocations	National industrial recovery appropriation	Emergency Appropriation Act, fiscal year 1935	Emergency Relief Appropriation Act, 1935
Total appropriations or by sales of securities.....	\$3,300,000,000.00	\$394,000,000.00	\$495,389,124.69
Deduct:			
Statutory allotments, impoundments, and transfers to other Federal departments, bureaus, agencies, etc.....	2,608,740,358.24	276,217,542.92	74,179,397.95
Funds transferred to U. S. Housing Authority and Puerto Rican Reconstruction Administration.....	28,805,459.72	-----	107,870,289.00
Total.....	2,637,545,817.96	276,217,542.92	182,049,686.95
Amount available and obligated for Public Works Administration program.....	662,454,182.04	117,782,457.08	313,339,437.74
Expenditures of available funds for loans and grants to States, municipalities, railroads, and other public bodies, including administrative expense:			
Year ended June 30, 1934.....	162,197,679.89	-----	-----
Year ended June 30, 1935.....	262,734,007.88	34,668,484.65	-----
Year ended June 30, 1936.....	129,061,129.27	40,517,046.53	113,583,336.21
Year ended June 30, 1937.....	62,762,994.91	24,536,295.38	116,612,257.27
Year ended June 30, 1938.....	20,581,753.10	10,027,559.65	54,670,219.52
Period July 1, 1938 to Feb. 28, 1939.....	6,854,890.40	2,213,937.48	9,465,048.22
Total expenditures.....	644,192,455.45	111,963,323.69	294,330,861.22
Unexpended balance as of Mar. 1, 1939.....	18,261,726.59	5,819,133.39	19,008,576.52

Allocations	Deficiency revolving fund	First Deficiency Appropriation Act, 1936	Public Works Administration Appropriation Act, 1938	Grand total
Total appropriations or by sales of securities.....	\$597,551,687.39	\$291,359,861.91	\$965,000,000.00	\$6,043,300,673.99
Deduct:				
Statutory allotments, impoundments, and transfers to other Federal departments, bureaus, agencies, etc.....	291,359,861.91	-----	205,999,206.91	3,456,496,367.93
Funds transferred to U. S. Housing Authority and Puerto Rican Reconstruction Administration.....	-----	-----	-----	136,675,748.72
Total.....	291,359,861.91	-----	205,999,206.91	3,593,172,116.65
Amount available and obligated for Public Works Administration Program.....	306,191,825.48	291,359,861.91	759,000,793.09	2,450,128,557.34
Expenditures of available funds for loans and grants to States, municipalities, railroads, and other public bodies including administrative expense:				
Year ended June 30, 1934.....	9,854,000.00	-----	-----	162,197,679.89
Year ended June 30, 1935.....	119,503,984.61	-----	-----	307,256,492.53
Year ended June 30, 1936.....	66,508,410.47	57,081,464.92	-----	402,665,496.62
Year ended June 30, 1937.....	33,567,997.58	106,032,778.71	-----	327,501,422.95
Year ended June 30, 1938.....	-----	-----	-----	224,880,308.56
Period July 1, 1938 to Feb. 28, 1939.....	21,476,000.00	48,519,750.32	185,968,648.65	274,498,275.07
Total expenditures.....	250,910,392.66	211,633,993.95	185,968,648.65	1,698,999,675.62
Unexpended balance as of Mar. 1, 1939.....	55,281,432.82	79,725,867.96	573,032,144.44	¹ 751,128,881.72

¹ All but \$15,000,000 of this amount is obligated.

TABLE 2.—*Value of material orders placed for projects financed by PWA funds,
July 1933 to March 1939*

All materials.....	\$2, 174, 833, 431
Textiles and their products.....	4, 243, 589
Awnings, tents, canvas, etc.....	337, 037
Carpets and rugs.....	210, 418
Cordage and twine.....	389, 134
Cotton goods.....	192, 829
Felt goods.....	269, 196
Jute goods.....	131, 136
Linoleum.....	2, 478, 563
Sacks and bags.....	58, 072
Upholstering materials, not elsewhere classified.....	141, 579
Waste.....	35, 625
Forest products.....	144, 466, 389
Cork products.....	671, 534
Lumber and timber products, not elsewhere classified.....	109, 887, 806
Planing-mill products.....	33, 263, 992
Window and door screens and weatherstrip.....	643, 057
Chemicals and allied products.....	19, 498, 648
Ammunition and related products.....	1, 226, 828
Chemicals, miscellaneous.....	613, 981
Compressed and liquefied gases.....	583, 872
Explosives.....	8, 175, 440
Paints and varnishes.....	8, 898, 527
Stone, clay and glass products.....	619, 007, 376
Asbestos products, not elsewhere classified.....	678, 046
Brick, hollow tile and other clay products.....	78, 028, 053
Cement.....	211, 222, 795
Concrete products.....	78, 607, 065
Crushed stone.....	57, 205, 209
Glass.....	5, 670, 792
Lime.....	878, 234
Marble, granite, slate and other stone products.....	45, 096, 324
Minerals and earths, ground or otherwise treated.....	346, 217
Sand and gravel.....	114, 061, 047
Tiling, floor and wall, and terrazzo.....	10, 774, 829
Wall plaster, wallboard, and insulating board.....	16, 438, 765
Iron and steel and their products, not including machinery.....	612, 600, 469
Bolts, nuts, washers, etc.....	6, 930, 874
Cast-iron pipe and fittings.....	66, 635, 464
Doors, shutters and window sash and frames, molding and trim (metal).....	28, 742, 075
Firearms.....	809, 012
Forgings, iron and steel.....	8, 815, 660
Hardware, miscellaneous.....	22, 403, 982
Heating and ventilating equipment.....	67, 495, 310
Nails and spikes.....	3, 241, 344
Rail fastenings, excluding spikes.....	6, 626, 272
Rails, steel.....	23, 912, 123
Springs, steel.....	630, 176
Steel-works and rolling-mill products, not elsewhere classified.....	113, 182, 643
Stoves and ranges, other than electric.....	849, 599
Structural and reinforcing steel.....	226, 452, 427

Prepared in the Bureau of Labor Statistics, Division of Construction and Public Employment.

TABLE 2.—*Value of material orders placed for projects financed by PWA funds, July 1933 to March 1939—Continued*

Iron and steel and their products—Continued.	
Switches, railway.....	81, 223, 982
Tools, other than machine tools.....	6, 549, 439
Wire products, not elsewhere classified.....	12, 475, 197
Wrought pipe.....	15, 624, 890
Nonferrous metals and their products.....	20, 053, 523
Aluminum manufactures.....	1, 125, 578
Copper products.....	2, 731, 986
Lead products.....	920, 066
Nonferrous-metal alloys and products, not elsewhere classified.....	3, 158, 522
Sheet-metal work.....	12, 041, 543
Zinc products.....	75, 828
Machinery, not including transportation equipment.....	356, 264, 837
Electrical machinery, apparatus, and supplies.....	94, 742, 776
Elevators and elevator equipment.....	11, 418, 672
Engine, turbines, tractors, and waterwheels.....	34, 028, 486
Foundry and machine shop products, not elsewhere classified.....	175, 414, 183
Machine tools.....	8, 920, 723
Meters (gas, water, etc.) and gas generators.....	2, 001, 747
Pumps and pumping equipment.....	25, 685, 708
Refrigerators and refrigerating and ice-making apparatus.....	4, 052, 542
Transportation equipment, air, land, and water.....	91, 031, 392
Aircraft (new).....	6, 036, 370
Airplane parts.....	5, 086, 654
Boats, steel and wooden (small).....	1, 631, 837
Carriages and wagons.....	65, 044
Locomotives, other than steam.....	11, 910, 325
Locomotives, steam.....	6, 864, 720
Motorcycles and parts.....	274, 395
Motor vehicles, passenger.....	534, 354
Motor vehicles, trucks.....	10, 484, 482
Railway cars, freight.....	38, 820, 468
Railway cars, mail and express.....	429, 443
Railway cars, passenger.....	8, 893, 300
Miscellaneous.....	307, 667, 208
Belting, miscellaneous.....	100, 988
Coal.....	2, 464, 591
Creosote.....	553, 636
Electric wiring and fixtures.....	54, 866, 879
Furniture, including store and office fixtures.....	26, 623, 560
Instruments, professional and scientific.....	2, 423, 744
Mattresses and bedsprings.....	167, 878
Models and patterns.....	64, 876
Paper products.....	234, 239
Paving materials and mixtures, not elsewhere classified.....	28, 964, 639
Petroleum products.....	53, 169, 177
Photographic apparatus and materials.....	383, 979
Plumbing supplies, not elsewhere classified.....	45, 786, 548
Radio apparatus and supplies.....	1, 101, 243
Roofing materials, not elsewhere classified.....	13, 538, 097
Rubber goods.....	1, 387, 431
Steam and other packing, pipe and boiler covering, and gaskets.....	3, 822, 361
Theatrical scenery and stage equipment.....	715, 072
Window shades and fixtures.....	949, 579
Other materials.....	70, 348, 691

Prepared in the Bureau of Labor Statistics, Division of Construction and Public Employment.

TABLE 3.—Estimated value of specified types of materials purchased per \$1,000,000 of contracts awarded for various types of construction

Type of material	Nonresidential building construction	Residential building construction	Naval vessels	Diesel power and light projects	Steam power and light projects	Reclamation projects	Sewage disposal systems	Street and road construction	Water supply systems
All types	\$541,000	\$457,000	\$406,000	\$776,000	\$728,000	\$480,000	\$509,000	\$482,000	\$604,000
Brick and hollow tile	42,000	43,500		12,700	7,500		10,500		8,900
Cement ¹	39,000	40,000		6,400	15,900	106,000	87,300	100,400	30,600
Electrical apparatus	41,000	27,000		331,400	416,600	82,000	34,000		13,700
Heating and ventilating material	36,000	45,200	76,000				2,600		1,800
Iron and steel products	150,000	104,200	113,000	35,500	56,600	108,000	146,000	122,000	375,800
Lumber	53,000	43,000	2,000	28,800	14,100	23,000	18,500	24,000	11,800
Plumbing fixtures and supplies	28,000	59,000	1,000	1,600	14,400		1,000		4,600
Sand and gravel ²	31,000	37,200		5,000	12,200	13,000	62,500	109,600	25,700
Other materials	121,000	57,000	208,000	354,600	204,700	148,000	146,600	126,000	131,100

¹ Includes cement in concrete products.

² Includes sand and gravel in concrete products.

Prepared in the Bureau of Labor Statistics Division of Construction and Public Employment.

TABLE 4.—Summary of securities purchased and under contract to be purchased, by programs
[As of Feb. 7, 1939]

	Total	NIRA 1933 program	ERA 1935 program	FDA 1936 program	PWAE 1937 pro- gram	PWAA 1938 pro- gram
Municipal securities:						
Unlimited tax obligations-----	\$219,498,438	\$184,823,650	\$22,880,935	\$2,360,220	\$2,217,000	\$7,216,633
Limited tax obligations-----	21,536,336	12,383,286	5,053,050	592,000	981,500	2,526,500
Special tax obligations (payable from taxes other than ad valo- rem)-----	9,077,893	8,189,893	503,000	-----	385,000	-----
Revenue obligations (payable solely from revenues of project or system)-----	307,464,823	173,274,473	73,913,800	13,743,850	24,980,000	21,552,700
Special revenue obliga- tions (additionally secured by recourse to taxes or other funds)-----	15,364,610	4,895,610	2,631,500	2,048,000	4,186,000	1,603,500
Special assessment bonds (without re- course to general taxes)-----	5,782,600	3,347,100	1,173,500	235,500	-----	1,026,500
Miscellaneous obliga- tions-----	18,383,810	7,045,400	70,000	1,140,910	145,000	9,982,500
Railroad securities-----	201,029,500	201,029,500	-----	-----	-----	-----
Limited dividend housing corporation bonds-----	22,175,724	22,175,724	-----	-----	-----	-----
Other corporate securities-----	1,880,607	1,133,707	336,900	191,500	54,000	164,500
Total-----	822,194,341	618,298,343	106,562,685	20,311,980	32,948,500	44,072,833

TABLE 5.—Public Works Administration bonds held by Reconstruction Finance Corporation

Type of bonds	Amount
Unlimited tax obligations payable from unlimited ad valorem taxes-----	\$22,081,939
Limited tax obligations payable from limited ad valorem taxes-----	2,551,975
Special tax obligations payable from other than ad valorem taxes-----	163,000
Revenue obligations payable solely from project or system revenues-----	79,196,140
Special revenue obligations, revenue obligation with recourse to taxation or general funds-----	4,616,000
Special assessment obligations payable solely from special assessments-----	2,482,300
Miscellaneous obligations of public bodies, bonds and warrants payable from delinquent ad valorem collections-----	1,707,529
Obligations of private corporations including housing loans but excluding railroads-----	11,082,452
Combination of 2 or more of the above types of security-----	283,400
	124,164,735

TABLE 6.—Summary of allotments, local funds provided for non-Federal projects distributed
by programs ¹
[As of Mar. 1, 1939]

Programs	Number of projects	Total estimated cost	Allotments	Local funds provided	Local funds to total estimated cost
NIRA program-----	3,702	\$1,097,706,261	\$672,018,434	\$425,687,827	Percent 38.81
ERA 1935 program-----	3,804	792,878,629	444,638,825	348,239,804	43.92
FDA 1936 program-----	1,768	393,323,050	179,642,771	213,680,279	54.33
PWAE 1937 program-----	1,191	261,279,132	144,695,914	116,582,218	44.62
PWAA 1938 program-----	6,180	1,425,223,488	683,755,318	741,468,170	52.02
Total-----	16,645	3,970,409,560	2,124,751,262	1,845,658,298	46.49

¹ Exclusive of allotments to railroads, private corporations, and limited dividend housing corporations.

TABLE 7.—Conservation projects which include hydroelectric features financed in whole or in part with PWA funds

NON-FEDERAL PROJECTS

Project	Applicant	Loan	Grant	Total PWA allotment	Total estimated cost	Installed capacity (kw.)
Arizona: Showlow	Showlow Silver Creek Water C. & P. District.	\$160,000	\$66,892	\$226,892	\$226,892	84
California: Hetch Hetchy	San Francisco City and County.	-----	1,058,000	1,058,000	4,335,179	(1)
Imperial	Imperial Irrigation District.	2,563,000	2,097,000	4,660,000	4,660,000	24,000
Colorado: Colorado Springs	City of Colorado Springs.	-----	211,405	211,405	469,790	2,000
Meeker	Town of Meeker	-----	12,272	12,272	27,272	200
Idaho: Soda Springs	Soda Springs	-----	19,636	19,636	43,636	150
Illinois: Lockport	Lockport	-----	230,000	230,000	800,000	12,000
Maine: Lewiston	Lewiston	-----	102,600	102,600	228,000	(1)
Michigan: Allegan	Allegan	345,000	99,352	444,352	456,000	1,350
Marshall	Marshall	-----	40,886	40,886	90,857	800
Nebraska: Sutherland	Platte Valley Public Power & Irrigation District.	8,646,000	2,580,000	11,226,000	11,226,000	25,000
Columbus	Loup River Public Power District.	8,788,000	4,026,000	12,814,000	12,814,000	45,500
North Loup	North Loup River Public Power and Irrigation District.	916,000	749,000	1,665,000	1,665,000	(2)
Tri-County	The Central Nebraska Public Power and Irrigation District.	19,793,000	16,193,000	35,986,000	36,516,000	54,000
Middle Loup	Middle Loup Public Power and Irrigation District.	765,000	625,909	1,390,909	1,390,909	(2)
North Carolina: High Point	City of High Point	3,571,000	2,921,600	6,492,600	6,492,600	21,000
Oklahoma: Grand River	Grand River Dam Authority.	11,563,000	8,437,000	20,000,000	20,000,000	57,000
Oregon: Enterprise	Enterprise Irrigation District.	40,000	28,636	68,636	68,636	600
South Carolina: Greenwood County	Greenwood County Finance Board.	3,944,000	1,291,000	5,235,000	5,235,000	21,000
Santee-Cooper	Santee-Cooper Public Service Authority.	18,865,000	15,435,000	34,300,000	40,300,000	132,600
Abbeville	City of Abbeville	239,000	196,000	435,000	570,000	2,000
Texas: Red Bluff	Red Bluff Water Control District.	2,206,000	722,000	2,928,000	2,928,000	2,875
L. C. R. A.	Lower Colorado River Authority.	15,000,000	7,350,000	22,350,000	35,630,000	87,000
Seguin	Seguin	-----	41,200	41,200	154,240	(1)
Utah: Parowan	Parowan	54,400	21,670	76,070	75,400	(1)
Ephraim	Ephraim	-----	12,000	12,000	26,755	(1)
Manti	Manti	-----	11,356	11,356	25,235	320
Brigham	Brigham City	-----	8,280	8,280	18,400	1,120
Virginia: Danville	Danville	-----	1,529,954	1,529,954	3,405,454	10,000
Washington: Ruby Dam	City of Seattle	-----	3,000,000	3,000,000	7,185,000	(2)
Spokane	City of Spokane	-----	193,500	193,500	687,500	3,900
Puerto Rico: Garzas	People of Puerto Rico.	1,510,000	1,235,000	2,745,000	2,745,000	9,000
Total		98,968,400	70,546,148	169,514,548	200,496,755	-----

See footnotes at end of table.

TABLE 7.—*Conservation projects which include hydroelectric features financed in whole or in part with PWA funds—Continued*

FEDERAL PROJECTS

Project	Government agency	PWA Federal allotment	Total estimated cost	Installed capacity
Arizona-Nevada: Boulder Canyon.....	Bureau of Reclamation.....	\$38,000,000	\$135,000,000	¹ 1,317,500
California:				
All-American Canal.....	do.....	10,000,000	38,500,000	(⁴)
Central Valley (Shasta).....	do.....	2,000,000	170,000,000	² 375,000
Colorado: Colorado-Big Thompson.....	do.....	1,150,000	44,000,000	² 142,500
Montana: Fort Peck.....	Corps of Engineers, U. S. Army.	49,531,000	122,900,000	³ 71,500
New Mexico: Rio Grande-Elephant Butte.	Bureau of Reclamation.....	2,000,000	20,300,000	³ 27,000
Tennessee: (TVA) Tennessee Valley Authority.	TVA.....	50,000,000	494,000,000	³ 793,100
Washington-Oregon: Bonneville.....	Corps of Engineers, U. S. Army.	42,950,000	75,000,000	⁵ 86,400
Washington: Grand Coulee.....	Bureau of Reclamation.....	27,005,000	394,500,000	³ 1,944,000
West Virginia: Tygart.....	Corps of Engineers, U. S. Army.	10,000,000	18,300,000	(⁶)
Wyoming: Kendrick.....	Bureau of Reclamation.....	9,130,000	20,000,000	37,500
Texas: L. C. R. A. Marshall Ford Dam.....	do.....	11,250,000		(⁷)
	Total.....	253,016,000	1,532,500,000	
	Grand total.....	422,530,548	1,732,996,755	

¹ Additions or alterations to existing facilities.

² No generation.

³ Kilovolt-amperes.

⁴ For installation see Imperial project above.

⁵ Kilowatts.

⁶ No initial installation.

⁷ See L. C. R. A. non-Federal project.

TABLE 8.—*Non-Federal electric power projects financed in whole or in part with PWA funds*

[As of Mar. 1, 1939]

	Number of projects	Kilowatt capacity installed	Loans	Grants	Total allotment	Estimated total cost
<i>New electric systems</i>						
Hydro.....	16	516,955	\$76,797,800	\$48,736,234	\$125,534,034	\$141,195,182
Steam.....	3	21,750		1,858,346	1,858,346	4,128,880
Diesel and other.....	52	34,138	2,600,300	3,357,232	5,957,532	8,698,051
Distribution and transmission.....	46		8,045,850	10,534,638	18,580,488	27,040,468
Total.....	117	572,843	87,443,950	64,486,450	151,930,400	181,062,581
<i>Additions to electric systems</i>						
Hydro.....	16	19,287	16,060,300	17,820,267	33,880,567	42,978,970
Steam.....	94	197,530	2,046,055	10,722,543	12,768,598	27,286,171
Diesel and other.....	63	25,356	244,485	2,042,903	2,287,388	4,928,487
Distribution and transmission.....	50		1,698,750	2,509,605	4,208,355	6,746,941
Total.....	223	242,173	20,049,590	33,095,318	53,144,908	81,940,569
Grand total.....	340	815,016	107,493,540	97,581,768	205,075,308	263,003,150

TABLE 9.—Total costs, waterworks and sewerage construction in the United States (1918–38) and approximate PWA aid

[Millions of dollars]

Year	Total construction activity	Sewerage systems				Waterworks				PWA aid			
		New construction	Maintenance	Work relief	Total	New construction	Maintenance	Work relief	Total	Sewerage systems		Waterworks	
										New construction	Percent ¹	New construction	Percent ^{1,2}
1918..	6,523	38	6	-----	44	56	32	-----	88	-----	-----	-----	-----
1919..	7,785	53	8	-----	61	71	37	-----	108	-----	-----	-----	-----
1920..	8,322	67	9	-----	76	86	44	-----	130	-----	-----	-----	-----
1921..	7,815	78	9	-----	87	100	45	-----	145	-----	-----	-----	-----
1922..	9,193	88	9	-----	97	113	48	-----	161	-----	-----	-----	-----
1923..	10,855	90	10	-----	100	113	49	-----	162	-----	-----	-----	-----
1924..	11,989	108	11	-----	119	155	51	-----	206	-----	-----	-----	-----
1925..	13,007	133	12	-----	145	145	50	-----	195	-----	-----	-----	-----
1926..	13,722	145	13	-----	158	140	54	-----	194	-----	-----	-----	-----
1927..	13,881	174	15	-----	189	138	56	-----	194	-----	-----	-----	-----
1928..	13,638	183	15	-----	198	117	57	-----	174	-----	-----	-----	-----
1929..	13,406	127	16	-----	143	126	58	-----	184	-----	-----	-----	-----
1930..	11,729	142	16	-----	158	201	64	-----	265	-----	-----	-----	-----
1931..	8,618	114	15	-----	129	156	64	-----	220	-----	-----	-----	-----
1932..	5,372	69	14	-----	83	87	56	-----	143	-----	-----	-----	-----
1933..	4,016	34	13	-----	47	50	4	-----	101	-----	-----	-----	-----
1934..	5,055	64	12	-----	76	53	19	-----	139	2	6	25	2
1935..	5,636	82	13	-----	95	56	13	-----	146	38	60	38	37
1936..	8,163	125	14	-----	139	77	59	-----	190	57	70	50	50
1937..	8,675	110	15	-----	125	90	41	-----	190	109	81	69	77
1938..	8,790	-----	-----	-----	211	100	35	-----	195	88	80	37	37
										52	-----	21	-----

¹ Percent of new sewerage construction of column 2.

² Percent of new waterworks construction of column 6.

The figures in this table are the estimated expenditures made during the year as contrasted with the final cost of projects upon which work was started during the year.

Column 1: Total construction activity includes expenditure for new construction, maintenance, and in the later years work-relief construction.

Columns 2 and 6: Include only new construction (PWA included in later years).

Columns 3 and 7: Include only maintenance.

Columns 4 and 8: Work-relief construction includes expenditures under the following agencies: 1. Civil Works Administration, 2. Federal Emergency Relief Administration, 3. Works Progress Administration.

Columns 10 and 12: Include only actual incurred expenditures of PWA, which are included in columns 2 and 6.

Sources: Construction and Real Property Section, Division of Economic Research, U. S. Department of Commerce and PWA.

TABLE 10.—Non-Federal sewerage and refuse projects

[As of Mar. 1, 1939]

	Number of projects	Estimated cost	Funds supplied by applicant ¹	Total	Loan	Grant
Total sewage disposal plants.....	873	\$325,357,874	\$122,298,876	\$203,058,998	\$85,405,015	\$117,653,983
Total sanitary sewers.....	463	87,614,366	41,533,453	46,080,913	11,335,649	34,745,264
Total storm sewers.....	116	20,576,184	11,022,708	9,553,476	2,049,887	7,503,589
Total combined sewers.....	75	32,759,590	12,537,254	20,222,336	8,196,295	12,026,041
Grand total sewer and water (jointly).....	196	23,786,950	6,565,476	17,221,474	8,407,156	8,814,318
Grand total garbage and rubbish disposal.....	41	10,909,406	4,299,333	6,610,073	2,743,750	3,866,323
Grand total sewerage systems.....	1,527	466,308,014	187,392,291	278,915,723	106,986,846	171,928,877

¹ Does not include loans by PWA.

TABLE 11.—*PWA non-Federal waterworks projects*

[As of Mar. 1, 1939]

SUMMARY OF NON-FEDERAL PROJECTS FOR ALL PROGRAMS

	Num- ber of projects	Estimated cost	Funds sup- plied by ap- plicants ¹	Total	Loan	Grant
Total complete water- works.....	1,867	\$235,624,162	\$105,918,010	\$129,706,152	\$39,619,321	\$90,086,831
Total reservoirs.....	182	26,663,718	10,790,832	15,872,886	8,347,445	7,525,441
Total filtration plants.....	118	18,462,805	10,902,294	7,560,511	889,600	6,670,911
Total water mains.....	252	31,094,968	15,441,772	15,653,196	5,755,108	9,898,088
Grand total water- works systems.....	2,419	311,845,653	143,052,908	168,792,745	54,611,474	114,181,271

¹ Does not include loans by PWA.TABLE 12.—*Summary of non-Federal hospital projects, by type*

[As of Mar. 1, 1939]

Type	Beds		Estimated cost		Approximate average cost, per bed	Num- ber of projects
	Number	Percent	Amount	Percent		
Insane asylums.....	49,725	45.5	\$121,903,571	36.9	\$2,450	205
Schools for feeble-minded.....	8,304	7.6	16,795,268	5.1	2,000	29
Epileptics.....	1,870	1.7	5,234,473	1.6	2,800	12
Tuberculosis.....	17,340	15.9	67,913,739	20.5	3,900	134
General.....	21,923	20.1	88,349,427	26.7	4,000	261
Charitable homes for aged.....	5,867	5.4	12,376,054	3.7	2,100	40
All others.....	4,147	3.8	18,199,963	5.5	4,400	81
Total.....	109,176	100.0	330,772,495	100.0	3,000	762

TABLE 13.—*Summary of PWA transportation projects, Federal and non-Federal programs, Mar. 1, 1939*

Type	Total Federal and non-Federal				
	Number of projects	Allotment		Funds supplied by applicant ¹	Estimated cost
		Loan	Grant	Total	
Grand total.....	13, 239	\$358, 314, 232	\$1, 090, 125, 771	\$1, 448, 440, 003	\$1, 910, 159, 338
Streets and highways.....	11, 428	17, 371, 775	648, 289, 688	665, 661, 463	920, 782, 657
Roads and highways.....	10, 439	11, 786, 000	578, 330, 089	591, 016, 089	740, 632, 994
Streets.....	939	4, 785, 775	57, 173, 086	61, 888, 861	139, 857, 032
Grade crossing elimination.....	229	3, 875, 000	317, 886, 493	321, 761, 493	40, 292, 631
Engineering structures.....	454	136, 009, 957	157, 738, 131	293, 748, 088	486, 288, 436
Bridges and viaducts.....	388	53, 279, 212	75, 855, 762	129, 134, 974	221, 911, 176
Wharves, piers, and docks.....	14	6, 411, 100	15, 794, 580	26, 205, 680	38, 451, 838
Subways and tunnels.....	11	75, 430, 645	17, 607, 146	93, 037, 791	206, 982, 348
Other.....	137	889, 000	14, 472, 643	15, 361, 643	18, 941, 074
Airports and related projects.....	384	-----	19, 336, 261	19, 336, 261	25, 418, 930
Water navigation aids.....	741	-----	264, 769, 691	264, 769, 691	276, 693, 815
Railroads.....	32	200, 974, 500	-----	200, 974, 500	200, 974, 500

See footnotes at end of table.

TABLE 14.—*Allotments to cities, counties, and States for the construction of buildings for administrative, legislative, judicial, and general governmental purposes*

(As of Mar. 1, 1939)

Type of project	Number of projects	Loans	Grants	Total allotments	Estimated cost
City and town halls.....	206	\$1,456,880	\$12,244,327	\$13,701,207	\$29,938,046
Courthouses.....	295	4,465,269	34,868,022	39,333,291	83,339,860
Other city, county, and State administrative and office buildings.....	130	811,400	14,257,265	15,068,665	35,106,755
Fire stations.....	101	144,100	2,986,151	3,130,251	7,205,863
Combined fire and police station.....	12	20,400	1,135,113	1,155,513	2,600,013
Fire alarm and police radio.....	22	375,110	853,033	1,228,143	2,252,840
Police stations.....	15	257,000	1,059,374	1,316,374	3,256,779
Jails and prisons.....	126	2,284,014	8,934,862	11,218,876	24,478,705
Corrective institutions.....	52	178,000	4,330,409	4,508,409	12,620,559
Social and recreational buildings.....	131	706,550	6,974,189	7,680,739	16,385,272
Auditoriums.....	50	908,625	5,741,633	6,650,258	16,857,394
Armories.....	52	45,000	4,882,202	4,927,202	13,167,793
Warehouses, shops, laboratories, etc.....	83	1,392,500	4,790,456	6,182,956	11,900,826
Archive buildings.....	3	-----	458,195	458,195	1,130,335
Abattoirs.....	4	-----	40,748	40,748	114,768
Markets.....	21	1,021,300	3,148,998	4,170,298	8,283,955
Farm buildings.....	7	-----	1,011,056	1,011,056	2,925,021
Miscellaneous buildings.....	182	3,844,718	16,661,858	20,506,576	41,997,461
Total buildings.....	1,492	17,910,866	124,377,891	142,288,757	313,562,245
Outdoor recreational facilities:					
Park developments.....	61	6,755,700	3,983,680	10,739,380	15,899,778
Swimming pools.....	65	130,500	1,956,239	2,086,739	4,556,997
Recreational centers.....	10	1,111,500	1,329,378	2,440,878	3,156,460
Grand total.....	1,628	25,908,566	131,647,188	157,555,754	337,175,480

NOTE.—Park developments also include sports facilities such as tennis courts and athletic fields. Recreational centers include recreation piers, golf courses, yacht harbors, and other sports facilities. In addition to 126 allotments for jails, there are 95 jails included in city halls and courthouses.

TABLE 15.—*Summary of PWA housing projects*¹

Project	Number of living units	Type of accommodations	PWA allotment
Atlanta, Ga., Techwood Homes.....	604	Apartments and group houses.....	\$2,933,500
Atlanta, Ga., University Homes.....	675	Group houses and flats.....	2,592,000
Atlantic City, N. J., Stanley S. Holmes Village.....	277	do.....	1,550,000
Birmingham, Ala., Smithfield Court.....	544	Group houses.....	2,500,000
Boston, Mass., Old Harbor Village.....	1,016	Apartments and group houses.....	6,636,000
Buffalo, N. Y., Kenfield.....	658	Apartments, group houses, and flats.....	4,755,000
Cambridge, Mass., New Towne Court.....	294	Apartments.....	2,500,000
Camden, N. J., Westfield Acres.....	515	do.....	3,116,160
Charleston, S. C., Meeting Street, Manor, and Cooper River Court.....	212	Group houses.....	1,305,000
Chicago, Ill., Jane Addams Houses.....	1,027	Apartments and group houses.....	7,041,759
Chicago, Ill., Julia C. Lathrop Homes.....	925	Apartments, group houses and flats.....	5,862,000
Chicago, Ill., Trumbull Park Homes.....	462	do.....	3,038,000
Cincinnati, Ohio, Laurel Homes.....	1,039	Apartments.....	7,086,000
Cleveland, Ohio, Cedar-Central Apartments.....	650	do.....	3,384,000
Cleveland, Ohio, Outhwaite Homes.....	579	Apartments, group houses and flats.....	3,564,000
Cleveland, Ohio, Lakeview Terrace.....	620	Apartments and group houses.....	3,800,000
Columbia, S. C., University Terrace.....	122	Apartments, group houses and flats.....	706,000
Dallas, Tex., Cedar Springs Place.....	181	do.....	1,020,000
Detroit, Mich., Brewster.....	701	do.....	5,200,000
Detroit, Mich., Parkside.....	775	do.....	4,500,000
Enid, Okla., Cherokee Terrace.....	80	Group houses.....	557,100
Evansville, Ind., Lincoln Gardens.....	191	Group houses and flats.....	1,000,000
Indianapolis, Ind., Lockefield Garden Apartments.....	748	Apartments and group houses.....	3,207,000
Jacksonville, Fla., Durkeeville.....	215	Group houses.....	948,000
Lackawanna, N. Y., Baker Homes.....	271	Group houses and flats.....	1,610,000
Lexington, Ky., Blue Grass Park, Aspendale.....	286	Group houses.....	1,704,000
Louisville, Ky., La Salle Place.....	210	do.....	1,350,000
Louisville, Ky., College Court.....	125	Group houses and flats.....	759,000
Memphis, Tenn., Dixie Homes.....	633	do.....	3,400,000

¹ As of Nov. 1, 1937, date on which these projects were transferred to the U. S. Housing Authority.

TABLE 15.—Summary of PWA housing projects—Continued

Project	Number of living units	Type of accommodations	PWA allotments
Memphis, Tenn., Lauderdale Courts.....	449	Apartments and group houses.....	\$3,128,000
Miami, Fla., Liberty Square.....	243	Group houses.....	968,880
Milwaukee, Wis., Parklawn.....	518	Apartments and group houses.....	2,600,000
Minneapolis, Minn., Sumner Field Homes.....	464	Apartments, group houses, and flats.....	3,632,000
Montgomery, Ala., Riverside Heights.....	100	Group houses.....	411,000
Montgomery, Ala., William B. Patterson Courts.....	156	do.....	506,000
Nashville, Tenn., Cheatham Place.....	314	do.....	2,000,000
Nashville, Tenn., Andrew Jackson Courts.....	398	Group houses and flats.....	1,890,000
New York, N. Y., Williamsburg Houses.....	1,622	Apartments.....	13,459,000
New York, N. Y., Harlem River Houses.....	574	do.....	4,219,000
Oklahoma City, Okla., Will Rogers Courts.....	354	Group houses.....	2,000,000
Omaha, Nebr., Logan Fontenelle Homes.....	284	Group houses and flats.....	1,955,000
Philadelphia, Pa., Hill Creek.....	258	do.....	2,110,000
Caguas, Puerto Rico, W. I., Caserio La Granja.....	78	Group houses.....	275,000
San Juan, Puerto Rico, W. I., Caserio Mirapalmeras.....	131	do.....	500,000
Schenectady, N. Y., Schonowee Village.....	219	Apartments.....	1,435,000
Stamford, Conn., Fairfield Court.....	146	Apartments and group houses.....	884,000
Toledo, Ohio, Brand Whitlock Homes.....	264	Apartments, group houses, and flats.....	2,000,000
Virgin Islands, W. I.: Bassin Triangle.....	30	Group houses.....	250,000
Marley Homes.....	38		
H. H. Berg Homes.....	58		
Washington, D. C., Langston.....	274	Apartments, group houses, and flats.....	1,842,000
Wayne, Pa., Highland Homes.....	50	Group houses and flats.....	344,000

TABLE 16.—Status of non-Federal projects

Region and State	Total			Completed		Under construction	
	Number of projects	Allotments	Estimated cost	Number of projects	Estimated cost	Number of projects	Estimated cost
Total.....	16,645	\$2,135,154,653	\$3,980,812,951	10,471	\$1,880,230,172	6,148	\$2,093,764,483
Region No. 1.....	3,090	684,935,472	1,371,351,472	2,016	642,621,037	1,073	728,210,435
Connecticut.....	261	27,878,569	69,637,149	210	30,462,583	51	39,174,566
Delaware.....	43	3,019,207	8,011,760	27	5,221,539	16	2,790,221
Maine.....	84	4,470,710	10,443,223	43	3,685,160	41	6,758,063
Maryland.....	142	31,799,693	69,977,758	90	21,648,173	52	48,329,585
Massachusetts.....	392	49,660,455	128,381,343	262	73,060,266	130	55,321,077
New Hampshire.....	112	6,881,271	16,016,722	75	7,761,532	37	8,255,190
New Jersey.....	319	58,453,379	102,828,767	201	51,376,796	118	51,451,971
New York.....	762	358,609,593	613,842,253	492	306,059,899	269	307,262,354
Pennsylvania.....	784	124,831,854	307,465,369	476	118,030,426	308	189,434,943
Rhode Island.....	87	15,866,352	36,503,018	65	20,751,390	22	15,751,628
Vermont.....	104	3,464,389	8,244,110	75	4,563,273	29	3,680,837
Region No. 2.....	3,419	445,187,725	854,959,732	2,013	359,514,143	1,402	493,793,219
Illinois.....	808	180,768,357	316,963,136	603	133,102,627	205	183,860,509
Indiana.....	477	44,426,198	94,628,104	293	44,966,322	184	49,661,782
Michigan.....	461	62,741,550	111,632,511	220	30,399,238	240	81,045,773
Ohio.....	1,061	102,700,866	209,677,428	564	95,153,886	494	113,058,672
West Virginia.....	150	19,522,920	38,238,987	97	16,537,159	53	21,701,828
Wisconsin.....	462	35,027,834	83,819,566	236	39,354,911	226	44,464,655
Region No. 3.....	2,832	310,576,071	505,088,728	1,694	195,694,393	1,134	308,721,608
Alabama.....	330	32,884,308	47,434,242	190	21,168,107	140	26,266,135
Florida.....	232	32,005,425	40,158,502	149	26,261,580	83	13,896,922
Georgia.....	518	19,946,569	39,260,252	279	18,851,032	238	20,376,493
Kentucky.....	298	25,590,476	50,759,091	170	20,419,212	127	30,011,879
Mississippi.....	231	34,083,642	67,398,028	157	11,311,377	74	56,086,651
North Carolina.....	352	38,309,694	61,782,341	198	25,358,387	153	36,398,954
South Carolina.....	243	61,582,049	74,516,998	167	17,871,004	76	56,645,994
Tennessee.....	278	35,672,250	66,892,598	178	27,874,752	100	39,017,846
Virginia.....	350	30,501,658	56,886,676	206	26,578,942	143	30,020,734

TABLE 16.—*Status of non-Federal projects—Continued*

Region and State	Total			Completed		Under construction	
	Number of projects	Allotments	Estimated cost	Number of projects	Estimated cost	Number of projects	Estimated cost
Region No. 4.....	2,611	216,606,906	406,033,966	1,623	218,708,816	979	185,744,130
Iowa.....	598	23,720,441	53,599,143	384	28,381,287	213	25,120,856
Minnesota.....	564	34,490,251	87,043,362	300	51,586,259	264	35,457,103
Missouri.....	562	47,079,695	120,139,894	317	63,505,120	240	55,774,390
Montana.....	161	19,575,442	26,610,343	114	15,732,842	45	10,653,865
Nebraska.....	307	73,242,300	85,528,633	215	37,578,915	91	47,549,718
North Dakota.....	193	6,359,158	12,996,931	130	8,154,133	63	4,842,798
South Dakota.....	168	7,490,007	12,153,802	130	10,041,867	38	2,111,935
Wyoming.....	58	4,649,612	7,961,858	33	3,728,393	25	4,233,465
Region No. 5.....	2,430	249,186,842	405,094,298	1,593	206,055,086	832	197,452,395
Arkansas.....	236	23,076,240	29,909,955	168	21,030,184	68	8,879,771
Colorado.....	206	20,614,168	46,132,802	122	31,723,198	84	14,409,604
Kansas.....	450	26,644,727	53,632,181	333	30,538,885	117	23,093,296
Louisiana.....	228	23,744,133	51,079,534	87	11,533,802	141	39,545,732
New Mexico.....	96	7,548,022	11,341,211	69	6,901,036	27	4,440,175
Oklahoma.....	302	38,557,609	51,886,062	213	21,888,778	88	29,507,284
Texas.....	912	109,001,943	161,102,553	601	82,439,203	307	77,576,533
Region No. 6.....	1,153	125,884,222	261,016,616	761	173,307,108	392	87,709,508
Arizona.....	122	11,882,388	17,717,206	78	9,936,670	44	7,780,536
California.....	807	103,036,566	222,670,026	527	149,856,404	280	72,813,622
Nevada.....	42	1,885,544	3,535,909	33	2,647,415	9	888,494
Utah.....	182	9,079,724	17,093,475	123	10,866,619	59	6,226,856
Region No. 7.....	977	58,593,490	124,033,329	714	67,388,097	262	55,916,232
Idaho.....	157	6,070,034	11,106,580	95	5,416,858	61	4,960,722
Oregon.....	291	16,688,026	30,062,208	170	18,577,555	121	11,484,653
Washington.....	496	33,854,571	80,100,226	427	41,919,045	69	38,181,181
Alaska.....	33	1,980,859	2,764,315	22	1,474,639	11	1,289,676
District of Columbia and Territories:							
District of Columbia.....	14	24,654,000	24,811,500	5	6,661,500	9	18,150,000
Hawaii.....	57	4,840,423	11,232,433	33	6,115,211	24	5,117,222
Puerto Rico.....	59	14,547,290	16,987,221	17	4,028,398	40	12,882,461
Virgin Islands.....	3	142,212	203,656	2	136,383	1	67,273

TABLE 17.—*Status summary of non-Federal projects for all programs*

[As of Mar. 1, 1939]

ALL APPLICATIONS FILED TO DATE ¹

Status	Number of projects	Funds requested recommended or allotted			Estimated cost
		Total	Loan	Grant	
Total filed.....	37, 271	\$8, 856, 147, 754	\$4, 788, 871, 383	\$4, 067, 276, 371	\$12, 212, 733, 502
Active.....	21, 919	3, 167, 138, 998	888, 391, 310	2, 278, 747, 688	5, 736, 675, 369
Allotted.....	16, 645	2, 135, 154, 653	626, 134, 786	1, 509, 019, 867	3, 980, 812, 951
Pending.....	5, 274	1, 031, 984, 345	262, 256, 524	769, 727, 821	1, 755, 862, 418
In central office.....	5, 272	1, 031, 705, 745	262, 105, 274	769, 600, 471	1, 755, 579, 418
In regional office.....	2	278, 600	151, 250	127, 350	283, 000
Inactive.....	15, 352	5, 689, 008, 756	3, 900, 480, 073	1, 788, 528, 683	6, 476, 058, 133

¹ For convenience, this summary also appears on reverse side.

TABLE 17.—*Status summary of non-Federal projects for all programs—Continued*

STATUS OF ALLOTTED PROJECTS, N. I. R. A. PROGRAM

Number of projects	Percent of total	Allotments			Estimated cost	Percent of estimated cost
		Total	Loan	Grant		
3, 702	100.00	\$682, 421, 825	\$417, 866, 743	\$264, 555, 082	\$1, 108, 109, 652	100.00
1	.03	650, 000	475, 000	175, 000	729, 000	.06
2	.05	411, 000		411, 000	1, 453, 200	.13
2	.05	277, 000	207, 000	70, 000	276, 273	.02
26	.70	170, 372, 056	121, 482, 866	48, 889, 190	202, 186, 105	18.25
3, 671	99.17	510, 711, 769	295, 701, 877	215, 009, 892	903, 465, 074	81.54
5	.13	1, 338, 000	682, 000	656, 000	2, 458, 473	.21

E.R.A. 1935 AND E.R.A. 1935 SUPPLEMENTAL PROGRAMS

3, 804	100.00	\$444, 638, 825	\$111, 393, 185	\$333, 245, 640	\$792, 878, 629	100.00
1	.03	520, 000	286, 000	234, 000	520, 000	.06
30	.79	136, 905, 667	56, 123, 000	80, 782, 667	189, 706, 423	23.93
3, 773	99.18	307, 213, 158	54, 984, 185	252, 228, 973	602, 652, 206	76.01
1	.03	520, 000	286, 000	234, 000	520, 000	.06

STATUS OF ALLOTTED PROJECTS, F. D. A. 1936 PROGRAM

Status ²	Number of projects	Percent of total	Allotments			Estimated cost	Percent of estimated cost
			Total	Loan	Grant		
Total-----	1, 768	100.00	\$179, 642, 771	\$20, 350, 525	\$159, 292, 246	\$393, 323, 050	100.00
Acceptance approved or agreement executed by PWA-----	1	.06	163, 636	90, 000	73, 636	163, 636	.04
Under construction-----	65	3.68	50, 833, 477	7, 015, 700	43, 817, 777	121, 986, 199	31.01
Completed-----	1, 702	96.26	128, 645, 658	13, 244, 825	115, 400, 833	271, 173, 215	68.95
Total not started-----	1	.06	163, 636	90, 000	73, 636	163, 636	.04

P. W. A. E. 1937 PROGRAM

Total-----	1, 191	100.00	\$144, 695, 914	\$32, 948, 500	\$111, 747, 414	\$261, 278, 132	100.00
Acceptance approved or agreement executed by PWA-----	2	.17	367, 500	103, 000	264, 500	587, 500	.22
Under construction-----	254	21.33	101, 808, 878	30, 314, 500	79, 494, 378	169, 354, 859	64.82
Completed-----	935	78.50	42, 519, 536	2, 531, 000	39, 988, 536	91, 335, 773	34.96
Total not started-----	2	.17	367, 500	103, 000	264, 500	587, 500	.22

² Each status group represents the present standing of projects. To arrive at the total number of projects upon which, for example, bids have been advertised, it is necessary to add figures in that status group plus those in succeeding status groups, i. e., "bids advertised," "contract awarded," "under construction," and "completed." To determine the number of projects upon which, for example, bids have not been advertised, it is necessary to add the figures for all status groups preceding "bids advertised."

TABLE 17.—*Status summary of non-Federal projects for all programs—Continued*

P. W. A. A. 1938 PROGRAM

Total.....	6, 180	100. 00	\$683, 755, 318	\$43, 575, 833	\$640, 179, 485	\$1, 425, 223, 488	100. 00
Agreement or offer accepted by applicant.....	1	. 02	545, 000	300, 000	245, 000	545, 000	. 04
Acceptance approved or agreement executed by PWA.....	5	. 08	477, 303	151, 000	326, 303	725, 123	. 05
Bids advertised.....	2	. 03	25, 977		25, 977	57, 727	. 01
Contracts awarded.....	9	. 14	920, 226	128, 000	792, 226	1, 760, 837	. 12
Under construction.....	5, 773	93. 42	676, 364, 533	42, 799, 433	633, 565, 100	1, 410, 530, 897	98. 97
Completed.....	390	6. 31	5, 422, 279	197, 400	5, 224, 879	11, 603, 904	. 81
Total not started.....	17	. 27	1, 968, 506	579, 000	1, 389, 506	3, 088, 687	. 22

NOTE.—Projects for railroad construction and low cost housing excluded; limited dividend housing projects included.

TABLE 18.—*Non-Federal projects ¹ portion of all programs completed*

[As of Mar. 1, 1939]

Program	Total estimated cost	Percent of completion	Portion of program completed		
			Total cost of work completed	Cost of projects completed	Reported project costs ² on un-completed projects
NIRA.....	\$1, 108, 109, 652	93. 1	\$1, 031, 650, 000	\$903, 465, 074	\$128, 184, 926
ERA 1935 and ERA 1935 supplemental.....	792, 878, 629	93. 5	741, 355, 000	602, 652, 206	138, 702, 794
FDA 1936.....	393, 323, 050	90. 6	356, 250, 000	271, 173, 215	85, 076, 785
PWAE 1937.....	261, 278, 132	66. 0	172, 350, 000	91, 335, 773	81, 014, 227
PWAA 1938.....	1, 425, 223, 488	13. 2	187, 850, 000	11, 603, 904	176, 246, 096
Total.....	3, 980, 812, 951	62. 5	2, 489, 455, 000	1, 880, 230, 172	609, 224, 828

¹ Projects for railroad construction and low-cost housing excluded, limited dividend housing projects included.

² Reported project costs represent the cost of material in place (including the cost of labor performed) and miscellaneous costs for that portion of the work completed.

TABLE 19.—Summary of non-Federal projects, by types

[As of Mar. 1, 1939]

Type of projects	Number of projects	Estimated cost	Funds supplied by applicants ¹	Allotment		
				Total	Loan	Grant
Grand total all types	16, 677	\$4, 181, 787, 451	\$1, 845, 658, 298	\$2, 336, 129, 153	\$827, 109, 286	\$1, 509, 019, 867
Streets and highways	1, 500	454, 480, 704	255, 121, 194	199, 359, 510	17, 371, 775	181, 987, 735
Roads and highways	606	288, 896, 392	159, 616, 885	129, 279, 507	11, 786, 000	117, 493, 507
Streets	782	128, 349, 349	74, 560, 491	53, 788, 858	3, 791, 900	49, 996, 958
Grade crossing elimination	29	30, 292, 631	17, 536, 138	12, 756, 493	11, 886, 493	11, 886, 493
Miscellaneous	83	6, 942, 332	3, 407, 680	3, 534, 652	923, 875	2, 610, 777
Sewers, waterworks, power, other facilities	4, 642	940, 066, 815	390, 469, 924	549, 596, 891	201, 549, 950	348, 046, 941
Sewer systems	1, 527	466, 308, 014	187, 392, 291	278, 915, 723	106, 986, 846	171, 928, 877
Sewage disposal plants	873	325, 357, 874	122, 298, 876	303, 058, 998	85, 405, 015	117, 653, 983
Sanitary sewers	463	87, 614, 366	41, 533, 453	46, 080, 913	11, 335, 649	34, 745, 264
Storm sewers	116	20, 576, 184	11, 022, 708	9, 553, 476	2, 049, 887	7, 503, 589
Combined sewers	75	32, 759, 590	12, 537, 254	20, 222, 336	8, 196, 295	12, 026, 041
Sewer and water	196	23, 786, 950	6, 565, 476	17, 221, 474	8, 407, 156	8, 814, 318
Water mains	2, 419	311, 845, 653	143, 052, 908	168, 792, 745	54, 611, 474	114, 181, 271
Filtration plants	252	31, 094, 968	15, 441, 772	15, 653, 196	5, 755, 108	9, 898, 088
Reservoirs	118	18, 462, 805	10, 902, 294	7, 560, 511	889, 600	6, 670, 911
Complete waterworks	182	26, 663, 718	10, 790, 832	15, 872, 886	8, 347, 445	7, 525, 441
Garbage and rubbish disposal	41	10, 909, 406	4, 299, 333	6, 610, 073	2, 743, 750	3, 866, 323
Gas plants	25	1, 811, 700	379, 344	1, 432, 356	813, 255	619, 101
Electric power excluding water power	283	96, 592, 939	35, 553, 355	61, 039, 584	23, 056, 200	37, 983, 384
Electric distribution system	53	9, 388, 694	2, 403, 368	6, 985, 326	4, 004, 000	2, 981, 326
Power construction	230	87, 204, 245	33, 149, 987	54, 054, 258	19, 052, 200	35, 002, 058
Miscellaneous	151	28, 812, 153	13, 227, 217	15, 584, 936	4, 931, 269	10, 653, 667
Buildings	9, 437	1, 784, 999, 690	923, 304, 132	861, 695, 558	143, 240, 312	718, 455, 246
Educational buildings	7, 282	1, 161, 117, 744	588, 068, 908	573, 048, 836	93, 789, 369	479, 259, 467
Secondary schools	6, 450	932, 880, 769	483, 320, 562	449, 560, 207	62, 943, 740	386, 616, 467
Colleges and universities	662	198, 164, 689	87, 238, 807	110, 905, 882	30, 458, 829	80, 447, 053
Other educational buildings	65	18, 112, 915	10, 605, 801	7, 507, 114	188, 000	7, 319, 114
Public libraries	105	11, 959, 371	6, 883, 738	5, 075, 633	198, 800	4, 876, 833
Municipal auditoriums and armories	102	30, 027, 187	18, 449, 727	11, 578, 460	953, 625	10, 625, 835
Courthouses and city halls	629	126, 527, 085	67, 806, 480	58, 720, 605	6, 343, 649	52, 376, 896
Hospitals and institutions	671	299, 603, 226	162, 931, 307	136, 672, 919	21, 511, 796	115, 158, 123
Penal institutions	178	37, 099, 264	21, 371, 779	15, 727, 282	2, 462, 014	13, 265, 271
Social, recreational buildings	131	16, 385, 272	8, 704, 533	7, 680, 739	6, 706, 550	6, 974, 189

Residential buildings.....	6	724, 100	404, 273	319, 827	811, 400	319, 827
Office and administrative.....	130	35, 106, 755	20, 038, 090	15, 068, 665	1, 392, 500	14, 257, 265
Warehouses, laboratories, shops, etc.....	83	11, 900, 826	5, 717, 870	6, 182, 956	10, 403, 391	4, 790, 456
Housing (limited dividend) ¹	7	11, 760, 399	1, 357, 008	10, 403, 391	4, 866, 018	21, 429, 917
Miscellaneous.....	218	54, 747, 892	28, 451, 957	26, 295, 935		
Flood control, water power and reclamation.....	131	194, 879, 209	15, 429, 766	179, 449, 443	105, 964, 711	73, 484, 732
Dams and canals.....	32	18, 347, 401	2, 147, 972	16, 199, 429	10, 923, 000	5, 276, 429
Channel rectification, levees, etc.....	3	2, 477, 831	48, 403	429, 428	283, 500	145, 928
Storage reservoirs.....	8	2, 678, 886	224, 537	2, 454, 349	1, 490, 600	963, 749
Water power development.....	16	102, 837, 980	8, 373, 827	94, 264, 153	57, 139, 000	37, 325, 153
Soil erosion.....	3	718, 120	260, 989	457, 131	135, 000	322, 131
Flood control.....	25	64, 047, 739	2, 005, 325	62, 042, 214	34, 946, 511	27, 095, 703
Miscellaneous.....	44	5, 771, 252	2, 168, 513	3, 602, 739	1, 047, 100	2, 555, 639
Water navigation aids.....	45	19, 641, 063	7, 966, 124	11, 674, 939	3, 958, 000	7, 716, 939
Dams and canals.....	2	522, 400	265, 730	256, 670	131, 000	135, 670
Channel rectification, levees, etc.....	6	4, 079, 582	183, 875	3, 915, 707	2, 813, 000	1, 118, 707
Other navigation aids.....	37	15, 012, 081	7, 316, 348	7, 502, 392	1, 014, 000	6, 488, 562
Engineering structures.....	473	463, 267, 643	192, 343, 348	270, 718, 295	136, 009, 957	134, 708, 338
Bridges and viaducts.....	379	220, 559, 376	92, 776, 202	127, 783, 174	53, 279, 212	74, 503, 962
Wharves, piers, and docks.....	53	29, 357, 399	12, 246, 158	17, 111, 241	6, 411, 100	10, 700, 141
Subways and tunnels.....	4	206, 385, 348	83, 647, 557	123, 037, 791	75, 431, 645	47, 607, 146
Other.....	27	6, 365, 520	3, 379, 431	2, 786, 089	889, 000	1, 897, 089
Aviation.....	25	3, 167, 596	1, 974, 115	1, 193, 481		1, 193, 481
Recreational.....	136	23, 613, 235	8, 346, 238	15, 266, 997	7, 997, 700	7, 269, 297
Miscellaneous.....	256	96, 696, 996	50, 497, 457	46, 199, 539	10, 042, 381	36, 157, 158
Railroads.....	32	200, 974, 500		200, 974, 500	200, 974, 500	

¹ Does not include loans by PWA.

² Figures as of Nov. 1, 1937, the date on which these projects were transferred to the U. S. Housing Authority.

NOTE.—Projects for low cost housing excluded.

TABLE 20.—Summary of Federal projects, by types

[As of Feb. 28, 1939]

	Total		NIRA		PWAA	
	Number of projects	Allotment	Number of projects	Allotment	Number of projects	Allotment
Grand total all types.....	17,780	\$1,767,532,236	15,940	\$1,567,533,029	1,840	\$199,999,207
Streets and highways.....	9,928	466,301,953	9,907	465,758,155	21	543,798
Roads and highways.....	9,824	461,736,602	9,811	461,471,254	13	265,348
Streets.....	8	272,448	8	272,448		
Miscellaneous.....	96	4,292,903	88	4,014,453	8	278,450
Utilities.....	768	33,539,174	469	15,703,550	299	17,835,624
Sewer systems.....	98	3,315,400	69	2,977,600	29	337,800
Sewage disposal plants.....	21	704,263	19	678,702	2	25,561
Sanitary sewers.....	72	2,345,755	46	2,042,016	26	303,739
Storm sewers.....	5	265,382	4	256,882	1	8,500
Sewer and water.....	29	641,705	26	588,705	3	53,000
Water systems.....	163	3,478,532	112	2,324,171	51	1,154,361
Water mains.....	38	395,684	29	215,584	9	180,100
Filtration plants.....	1	339,504	1	339,504		
Reservoirs.....	21	576,153	12	150,876	9	425,277
Complete waterworks.....	103	2,167,191	70	1,618,207	33	548,984
Garbage and rubbish disposal.....	20	136,133	14	95,533	6	40,600
Gas plants.....	1	48,990	1	48,990		
Electric power excluding water power.....	92	15,602,952	56	3,014,052	36	12,588,900
Electric distribution systems.....	39	11,151,423	22	210,423	17	10,941,000
Power construction.....	53	4,451,529	34	2,803,629	19	1,647,900
Miscellaneous.....	365	10,315,462	191	6,654,499	174	3,660,963
Buildings.....	3,167	303,581,146	2,491	197,596,384	676	105,984,762
Educational buildings.....	206	20,597,448	169	13,553,074	37	7,044,374
Secondary schools.....	149	8,025,976	129	6,469,904	20	1,556,072
Colleges and universities.....	36	5,785,401	28	2,840,401	8	2,945,000
Other educational institutions.....	21	6,786,071	12	4,242,769	9	2,543,302
Auditoriums and armories.....	1	148,000	1	148,000		
Courthouses and city halls.....	30	1,312,012	24	1,045,320	6	266,692
Post offices.....	406	43,607,814	406	43,607,814		
Hospitals and institutions.....	151	36,887,384	99	15,882,873	52	21,004,511
Penal institutions.....	75	14,914,079	34	1,030,479	41	13,883,600
Social, recreational buildings.....	28	1,783,740	22	1,363,104	6	420,636
Residential.....	551	74,779,876	382	35,677,165	169	39,102,711
Office and administrative.....	211	39,826,458	182	38,973,773	29	852,685
Warehouses, laboratories, shops.....	678	36,846,985	425	17,092,435	253	19,754,550
Housing projects.....	74	8,882,773	74	8,882,773		
Miscellaneous.....	756	23,994,577	673	20,339,574	83	3,655,003
Flood control, water power, reclamation.....	339	262,525,470	281	228,306,870	58	34,218,600
Dams and canals.....	149	74,015,196	108	50,121,596	41	23,893,600
Channel rectification, levees, etc.....	18	3,276,100	11	276,100	7	3,000,000
Storage reservoirs.....	18	9,447,800	14	8,747,800	4	700,000
Water power development.....	10	81,670,700	7	77,170,700	3	4,500,000
Soil erosion.....	93	14,467,647	93	14,467,647		
Miscellaneous.....	51	79,648,027	48	77,523,027	3	2,125,000
Water navigation aids.....	696	257,038,352	547	253,520,844	149	3,517,508
Dams and canals.....	29	92,544,836	28	91,944,836	1	600,000
Channel rectification, levees, etc.....	164	101,754,518	136	100,590,620	28	1,163,898
Locks.....	35	30,958,485	35	30,958,485		
Lighthouses.....	212	3,929,489	141	2,784,539	71	1,144,950
Other navigation aids.....	256	27,851,024	207	27,242,364	49	608,660
Vessels.....	259	270,637,973	206	265,910,090	53	4,727,883
Naval.....	60	238,797,527	59	238,697,527	1	100,000
Coast guard.....	99	26,458,450	65	24,738,967	34	1,719,483
Nonmilitary.....	100	5,381,996	82	2,473,596	18	2,908,400

TABLE 20.—*Summary of Federal projects, by types*—Continued

[As of Feb. 28, 1939]

	Total		NIRA		PWAA	
	Number of projects	Allotment	Number of projects	Allotment	Number of projects	Allotment
Engineering structures.....	181	\$23,021,793	111	\$17,005,485	70	\$6,016,308
Bridges and viaducts.....	9	1,351,800	7	1,318,960	2	32,840
Wharves, piers, docks.....	62	9,094,439	44	5,032,399	18	4062,040
Other.....	110	12,575,554	60	10,654,126	50	1,921,428
Aviation.....	342	43,523,468	294	28,321,523	48	15,201,945
Aircraft.....	48	19,185,994	47	16,185,994	1	3,000,000
Improvement to landing fields.....	193	21,101,415	147	8,934,470	46	12,166,945
Other aids.....	101	3,236,059	100	3,201,059	1	35,000
Recreational.....	83	2,666,566	76	2,595,221	7	71,345
Miscellaneous.....	2,017	104,696,341	1,558	92,814,907	459	11,881,434
Surveying and mapping.....	610	18,141,738	487	15,647,738	123	2,494,000
Miscellaneous improvements to Federal land.....	285	22,895,327	227	22,141,638	58	753,689
Ordnance.....	50	7,108,167	50	7,108,167		
Machine tools for navy yards.....	81	4,129,547	79	3,354,547	2	775,000
Game and fish protection.....	193	2,211,479	101	883,013	92	1,328,466
Other pest and disease control.....	146	5,734,141	146	5,734,141		
Other.....	652	44,475,942	468	37,945,663	184	6,530,279

TABLE 21.—*Non-Federal projects, Federal projects, and Federal low-cost housing projects, all programs*

[Table showing estimated cost and allotments, distributed by type of project, as of March 1, 1939]

Type of project	Number of projects	Total estimated cost	Allotment		
			Total	Loan	Grant ¹
Educational buildings.....	7,488	\$1,181,715,192	\$593,646,284	\$93,789,369	\$499,856,915
Hospitals and institutions for medical treatment.....	822	336,490,610	173,557,303	21,511,796	152,045,507
Public buildings.....	4,287	558,614,635	387,669,726	17,535,756	370,133,970
Sewer systems.....	1,850	494,052,069	300,094,302	115,394,002	184,700,300
Water systems.....	2,582	315,324,185	172,271,277	54,611,474	117,659,803
Electric power, excluding water power.....	375	112,195,891	76,642,536	23,056,200	53,586,336
Streets and highways.....	11,428	920,782,657	665,661,463	17,371,775	648,289,688
Engineering structures.....	654	486,289,436	293,740,088	136,009,957	157,730,131
Flood control, water power and reclamation.....	470	457,404,679	441,974,913	105,964,711	336,010,202
Limited dividend housing ²	7	11,760,399	10,403,391	10,403,391	
Federal low-cost housing ²	51	136,669,759	136,669,759		136,669,759
Railroads.....	32	200,974,500	200,974,500	200,974,500	
Vessels.....	259	270,637,973	270,637,973		270,637,973
All others.....	4,203	603,077,461	516,387,633	30,486,355	485,901,278
Total.....	34,508	6,085,989,446	4,240,331,148	827,109,286	3,413,221,862

¹ Includes allotments to Federal agencies.² Figures as of Nov. 1, 1937, the date on which these projects were transferred to the U. S. Housing Authority.

Allotments made available under authority of the Fourth Deficiency Act, fiscal year 1933 (Public, No. 77, 73d Cong.), the Emergency Appropriation Act, fiscal year 1935 (Public, No. 412, 73d Cong.), the Emergency Relief Appropriation Act of 1935 (Public Res. No. 11, 74th Cong.), the First Deficiency Appropriation Act, fiscal year 1936, the Public Works Administration Extension Act of 1937, and the Public Works Administration Appropriation Act of 1938.

Index

A

	Page
Alabama: Mobile Tunnel.....	187
Alabama Power Co.....	57-59, 123
Alabama, University of.....	135
Alburt, Vt.....	129-130
Alcatraz Penitentiary.....	200
All-American Canal.....	110
Annapolis, Md.....	164-165
Appleton, Wis.....	163
Arkansas: Mental hospitals.....	147
Arkansas, University of.....	152
Armories.....	202-203
Arp, Tex.....	177
Asheville, N. C.....	201
Astoria, Oreg.....	184
Atlanta:	
Federal Penitentiary.....	200
Police headquarters.....	199
Regional office. (See footnote.).....	45
Techwood Homes.....	207-208, 211, 216
Atlanta Penitentiary.....	200
Atlantic City.....	212
Auburn (N. Y.) prison.....	200
Auditoriums.....	200-201, 203, 238-241
Aviation.....	108, 191-192, 254

B

Barre, Vt.....	201
Barton County, Mo.....	200
Bidding.....	78-79, 82, 88-90
Big Sandy, Tex.....	177
Birmingham, Ala.....	212, 216
Bloomdale, Ohio.....	174
Bond sales.....	63, 67-68, 229
Bonneville Dam.....	115-119, 190
Boston:	
General Hospital.....	146
Housing.....	216
Municipal credit.....	6
Police radio.....	198
Boulder Dam.....	110-112
Bound Brook, N. J. (See footnote.).....	156
Bridgeport, Tex.....	177
Brooklyn, N. Y.....	134, 214
Brownsville, Tex.....	231-234
Budget Bureau.....	98

Buffalo:

	Page
Convention Hall.....	201
Housing.....	212
Sewage plant.....	161
Sewer authority.....	54
Building specifications.....	77-78
Buildings, public.....	8, 30
Bureau of Labor Statistics.....	18-20, 22, 23, 26-28, 30, 31, 215
Business cycles.....	11, 70, 95, 221-22

C

California:

Alameda-Contra Costa Tunnel.....	187
All-American Canal.....	110
Legislation.....	55, 247
Los Angeles schools.....	244-248
Camden, N. J.....	188
Canadian, Tex.....	177
Cape May, N. J.....	205
Capital goods.....	9
Carmody, John M.....	II
Change orders.....	80
Charleston, S. C.....	212, 216
Charleston, W. Va.....	201
Charlotte, N. C.....	198

Chicago:

Housing.....	210
Municipal credit.....	6
Regional office. (See footnote.).....	45
Sewerage system.....	162, 234-238
Subway.....	79, 187
Water supply.....	172, 173-174

Cincinnati:

Housing.....	211
Municipal credit.....	6
Civil Aeronautics Authority.....	191
Civil Works Administration.....	39, 220
Cleveland.....	211, 213, 216
Colleges. (See Schools.)	

Colorado:

Denver water supply.....	248-252
Federal prison.....	200
Legislation.....	52
Columbia, S. C.....	203
Columbus, Ga.....	133

Connecticut:	Page
Federal prison.....	200
Mental hospitals.....	147, 148
Construction:	
Early Federal.....	95-97
PWA standards.....	81-82, 139, 227
United States, total.....	2, (<i>chart</i>) 3
Water supply.....	172
Consumers goods.....	9, 20-23
Contracts:	
Bidding.....	78-79, 82, 88-90
Specifications.....	77-78
Contractors.....	19, 90
Corpus Christi, Tex.....	190
Costigan, Sen. Edward P.....	4
Courthouses.....	25-26, 196-197
Credit.....	10, 11, 37, 62-63, 69
Criteria:	
For employment.....	39-40
For projects.....	36, 62-63, 73-82
Culpeper, Va.....	121
Cutting, Sen. Bronson.....	4

D

Danville, Va.....	121
Delaware:	
Legislation.....	52
Water supply.....	173
Delaware, Ohio.....	197
Denison, Tex.....	177
Denver.....	172, 248-252
De Pere, Wis.....	163
Des Moines.....	160, 198
Detroit: Brewster housing project..	90
District of Columbia.....	164

E

Education. (<i>See</i> Schools.).....	127-139
Electric power:	
Bonneville Dam.....	116-119
Boulder Dam.....	112
Cascade Locks, Wash.....	116
Culpeper, Va.....	121
Danville, Va.....	121
Employment.....	30
Hoisington, Kans.....	121
Legislation.....	41
Litigation.....	56-59, 123
Lower Colorado River author- ity.....	119-122
Nebraska.....	120
PWA policy.....	123-124
Steam and Diesel plants.....	121
Engineering criteria.....	73-82

F

Federal Employment Stabilization Board.....	12, 36, 98
Federal Works Agency.....	II, VI
Financial criteria.....	62, 63
Fire stations.....	198
Flemington, N. J. (<i>See</i> footnote.)..	156
Flood reduction:	
Boulder Dam.....	110-112
Lower Colorado River.....	119
Mississippi River.....	110
Muskingum Valley, Ohio..	109, 258-261
Nebraska.....	120
Florida:	
Legislation.....	52
Overseas Highway.....	70, 187, 241-244
Tuberculosis hospital.....	149
Fort Peck Dam.....	190
Fort Smith, Ark.....	66-67
Fort Worth. (<i>See</i> footnote.).....	45, 203
Fremont, Nebr.....	201

G

Gadsden, Ala.....	201
Gainesville, Mo.....	197
Gallatin, Albert. (<i>See</i> footnote.)...	96
Genesee Co., N. Y.....	134
Georgia: Constitution.....	53
Georgia, University of.....	152
Glen Rose, Tex.....	177
Gold Beach, Oreg.....	182-183
Goose Creek, Tex.....	177
Grade Crossings.....	188
Grand Coulee Dam.....	26, 88, 117-119
Grand River Dam.....	119
Grandview, Tex.....	177
Grants in aid.....	18, 37, 43, 95-97
Green Bay, Wis.....	163
Gulfport, Miss.....	190

H

Hallettsville, Tex.....	177
Hammond, Ind.....	201
Hearne, Tex.....	177
Highland Park, N. J. (<i>See</i> foot- note.).....	156
Hoisington, Kans.....	121
Holland, Mich.....	124
Hoover, Herbert C.....	4, 12
Hospitals.....	8
Arkansas, University of.....	152
Federal.....	151
Florida.....	149

Hospitals—Continued	Page
Georgia, University of	152
General	143, 144–146
Homes for Aged	150
Illinois, University of	152
Indiana, University of	152
Kansas, University of	152
Louisville, University of	152
Mansfield, Conn	148
Maryland, University of	152
Mental	142, 146–148
Moose Lake, Minn	147
Need for	142–144, 153
New Orleans	144–146
New York City	152
Rhode Island	147
Rolla, Mo	153
Special	153
Syracuse University	151
Tuberculosis	148–150
University	151–152
Washington, University of	253
Westchester Co., N. Y	150
Housing	41, 108–109, 207–217
Houston, Tex	190
Howard University	137
Humble, Tex	177

I

Ickes, Harold L	V–VI, 34, 57, 123, 229
Idaho: Legislation	52
Illinois: Army Air Field	107
Illinois, University of	152
Indiana: Federal prison	200
Indiana, University of	152
Indianapolis. (<i>See</i> footnote.)	134,
	152, 211, 213, 216
Indians	109, 136
Industry:	
Brick and tile	24
Cement and concrete	27, 221
Electrical goods	24
Material orders	19–21,
	227–231, 234–238, 241, 244,
	248, 252, 255, 258.
Sand and gravel	24, 27
Steel and iron	27
Inspection	40, 79–80
Interstate Sanitation Commission	161
Investigation	41, 86–91
Iowa:	
Davenport Bridge	187
Stream pollution	160

Irrigation:	Page
All-American Canal	110
Denver County	248, 251
Nebraska	120
Willacy County, Tex	233

J

Jails and prisons	199–200
Joliet (Ill.) Prison	200
Justice, Department of	57, 87, 91, 200

K

Kansas City, Mo	238–241
Kansas, University of	152
Kaukauna, Wis	163
Kentucky:	
Federal prison	200
Gold depository	106–107
Legislation	56
Key West, Fla	241–244
Keyport, N. J. (<i>See</i> footnote.)	156
Keyser, W. Va	80

L

Labor:	
Costs	82
Direct and indirect	28, 30
Employment	17–31, 227–229,
	231, 234, 238, 241, 244,
	248, 252, 255, 258.
Hours	39, 86
“Kick-back”	40, 87
Misclassification	88
Selection	86
Strikes	86
Wages	9, 43, 84, 85
Workers	2
LaFollette, Sen. Robert M., Jr.	4
Langley Field, Va	107–108, 191
Laws:	
Federal	2, 12, 33–46, 98–99
Housing	209, 217
Litigation	56–59, 212
Local	49–60, 65–66, 220, 247, 259
Stream pollution	159
Leonard, Tex	177
Linden, Tex	177
Little Chute, Wis	163
Lobbying	91
Long Beach, Calif	244–248
Long Beach, N. Y	64, 205
Los Angeles:	
Schools	79, 244–248
Water supply	112, 172

	Page
Louisiana State University.....	146
Louisville, Ky.....	212, 214
Louisville, University of.....	152
Lower Colorado River Authority..	119, 122
Lyme, Conn.....	130-131

M

Maine: Deer Isle Bridge.....	187
Manville, N. J. (<i>See footnote.</i>)..	156
Markets, public.....	203-204
Marshfield, Oreg.....	183
Maryland:	
Legislation.....	52
Stream pollution.....	164
Maryland, University of.....	152
Memorials.....	203
Memphis:	
Electric distribution.....	122
Housing.....	210, 216
Safety of workers.....	88
Menasha, Wis.....	163
Metuchen, N. J. (<i>See footnote.</i>)..	156
Miami.....	214, 216
Middlesex, N. J. (<i>See footnote.</i>)..	156
Milwaukee.....	157
Mina, Nev.....	174
Minneapolis.....	157, 165, 202
Minnesota:	
Asylum.....	147
Legislation.....	55
Roads and highways.....	185
Mobile, Ala.....	190, 204
Mobridge, S. Dak.....	201
Moffat Tunnel.....	250
Montgomery, Ala.....	211, 216
Morehead City, N. C.....	190

N

Naples, Tex.....	177
National defense.....	107-108
National Health Conference.....	142
National Industrial Recovery Act (N. I. R. A.).....	2, 34, 104, 209, 219
National Reemployment Service...	86, 88
Naval vessels.....	30, 37
Navigation.....	96, 112, 119, 189-190, 231-234, 235
Nebraska: Electric power.....	120
Neenah, Wis.....	163
New Brunswick, N. J. (<i>See foot- note.</i>).....	156

New Jersey:	Page
Legislation.....	52
Mental hospitals.....	147
Stream pollution.....	155-166
New Mexico: Legislation.....	52
New Orleans.....	144, 203, 210

New York City:

Brooklyn college.....	134
Housing.....	210, 213-214
Labor.....	43
Lincoln Tunnel.....	43
Municipal credit.....	63
Regional office. (<i>See footnote.</i>)..	45
Traffic problem.....	186, 226
Triborough Bridge.....	70, 186, 226-230
Subways.....	187
Water supply.....	172

New York State:

Buffalo Sewer Authority.....	54
Home for aged.....	150
Legislation.....	52, 55
Mental hospitals.....	147
Stream pollution.....	161
Newport, Oreg.....	182-183
Niagara River.....	161
North Carolina: Mental hospitals..	147

O

Oakland, Calif.....	25-26, 196
Ohio:	
Flood reduction.....	109, 258-261
Legislation.....	52
Water supply.....	173
Oklahoma: Electric power.....	119
Oklahoma City.....	200-201
Olean, N. Y.....	169
Omaha. (<i>See footnote.</i>).....	45
Oregon:	
Coastal highway.....	182-184
State Capitol.....	197
Organization of PWA.....	34-35, 44-46
Oshkosh, Wis.....	163

P

Pasadena, Tex.....	177
Pecos, Tex.....	177
Pennsylvania:	
Express highway.....	188
Legislation.....	55
Pennsylvania Railroad.....	189
Performance bonds.....	79
Personnel.....	33-35, 44-45
Perth Amboy, N. J. (<i>See footnote.</i>)..	156

	Page
Philadelphia, Pa.....	132, 188, 210, 216
Pittsburg, Tex.....	177
Plainfield, N. J. (<i>See</i> footnote.) ..	156
Police stations.....	196-200
Port Lavaca, Tex.....	204
Portland. (<i>See</i> footnote.).....	45
Post offices.....	106
Providence, R. I.....	191
Public Health (<i>See also</i> Hospitals).	
Indians.....	109
Hospitals and clinics.....	141-153
Needs.....	142-144
Sewage.....	155-166, 234
Water supply.....	169-179
Public Works:	
Planning.....	11-14, 97-98, 222
PWA criteria.....	36
Ratio of labor to materials.....	20-21
Regenerative effects.....	10
Revenue producing.....	8, 203-205
Theory of.....	1-14

R

Railroads.....	41, 188-189, 220
Raritan, N. J. (<i>See</i> footnote.).....	156
Raritan River.....	70, 155-156
Reclamation.....	30
Reconstruction Finance Corpora- tion.....	6, 183
Regional offices.....(<i>chart</i>)	42, 44, 45
Rental, housing.....	215-216
Revenue bonds.....	53, 56, 65-67, 69
Rhode Island: Mental hospital....	147
Roads and highways.....	8, 30, 36, 97, 104-106, 182-188, 226-230, 241-244
Rochester, N. Y.....	136
Rolla, Mo.....	153
Roosevelt, Theodore.....	96
Round Rock, Tex.....	177

S

Salem, Oreg.....	197
St. Paul.....	156, 165
San Antonio, Tex.....	210
San Francisco:	
Fair.....	10
Municipal credit.....	6
Regional office. (<i>See</i> footnote.)..	45
United States mint.....	106
Santa Anna, Tex.....	177
Santee Cooper project.....	119
Sayreville, N. J. (<i>See</i> footnote.)..	156

Schools:	Page
Alabama, University of.....	135
Alburt, Vt.....	129-130
Arkansas, University of.....	152
Brooklyn, N. Y.....	134
Columbus, Ga.....	133-134
Consolidation.....	130-132
Construction.....	8, 127-139
Construction standards.....	138, 139
Genesee County, N. Y.....	134
Georgia, University of.....	152
Howard University.....	137
Illinois, University of.....	152
Indiana, University of.....	152
Indianapolis. (<i>See</i> footnote.).....	134
Indian.....	109, 136
Kansas, University of.....	152
Keyser, W. Va.....	80
Long Beach, N. Y.....	16
Los Angeles.....	79
Louisville, University of.....	152
Lyme, Conn.....	130-131
Maryland, University of.....	152
Modernization.....	132-135
Palm Springs, Calif.....	130
Philadelphia.....	132
Rochester, N. Y., Library.....	136
Safety factors.....	137
Syracuse University.....	151
Topeka.....	22-24
United States Military Academy...	136
United States Naval Academy.....	136
Virginia.....	131
Virginia Polytechnic Institute....	135
Washington, University of.....	252-255
Seattle.....	253
Sewage:	
Carlstadt, N. J.....	77
Chicago.....	162, 234-238
District of Columbia.....	164
Economic losses.....	156-158
Fox River.....	162-163
Garbage disposal.....	166
Iowa.....	160
Minneapolis.....	165
Mississippi River.....	157
New York State.....	160-161
Ohio.....	161-162
Ohio River.....	157
Perth Amboy, N. J.....	156
Raritan River.....	155-166
St. Paul.....	165
Treatment plants....	8, 30, 155-166, 237

Sewage—Continued	Page
Wisconsin.....	162-163
Sing Sing (N. Y.) Prison.....	200
Snyder, Okla.....	173
Somerville, N. J. (See footnote.)..	156
South Carolina:	
Electric power.....	119
Water supply.....	177
South Dakota: State Hotel.....	204
South River, N. J. (See footnote.)..	156
Stamford, Conn.....	216
Stockton, Calif.....	204
Stream pollution.....	53, 155-166, 234-235
Supreme Court.....	58-59, 235
Sutherland, Justice.....	58
Syracuse University.....	151

T

Texas:	
Federal prison.....	200
Legislation.....	55
Lower Colorado River author- ity.....	119-122
Water supply.....	177
Tonawanda, N. Y.....	161
Topeka:	
Auditorium.....	201
School.....	22-26
Wage expenditures.....	22-26
Transportation.....	181-193, 226-230, 241-244
Treasury, United States.....	41
Triborough Bridge authority.....	70, 186, 226-230
Tulane University.....	146
Tyronza, Ark.....	176

U

University Park, Tex.....	177
Universities. (See Schools.)	
United States Military Academy....	136
United States Naval Academy.....	136, 164-165
United States Public Health Serv- ice.....	142
Utah: Ogden reclamation project....	112

V

Virginia:	Page
Blue Ridge Parkway.....	104
Legislation.....	52
Schools.....	131
Stream pollution.....	164
Virginia Polytechnic Institute.....	135

W

Wages, distribution of.....	20, 22
Wagner, Sen. Robert F.....	4, 217
Warehouses.....	204
Washington, D. C.....	216
Washington National Airport.....	191
Washington State.....	26, 88, 116-119, 252-255
Washington, University of.....	252-255
Water supply:	
Bloomdale, Ohio.....	174
Chicago.....	172, 173-174
Delaware.....	173
Denver.....	172
Economic value.....	171, 176-178
Employment.....	30
Fire-insurance rates.....	171, 176-177
Los Angeles.....	172
Mina, Nev.....	174
New York City.....	172
Ohio.....	173
Quality of.....	170
Snyder, Okla.....	173
South Carolina.....	177
Texas.....	177
Treatment.....	77, 174, 175-176
Tyronza, Ark.....	176
Webster, N. Y.....	170-171
West Virginia.....	170
Wilton, Ala.....	173, 255-257
Wayne, Pa.....	214
Webster, N. Y.....	170-171
West Virginia:	
Kanawha Dam.....	112
Water supply.....	177
Willacy Co., Tex.....	233
Wilton, Ala.....	173, 255-257
Woodbridge, N. J. (See footnote.)..	156

